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ANTIMICROBIAL THERAPY OF PULMONARY TUBERCULOSIS

Current Status

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EFFECTIVE chemotherapy against tuberculosis in man first became available with the advent of streptomycin (SM) in 1946. In the 9 years since that time a vast amount of research has gone into the evaluation of technics of treatment with new drugs. There are still many serious problems in the treatment of pulmonary tuberculosis which await solution.

The response of tuberculous lesions of the lung to our present methods of chemotherapy seems to depend greatly on the age and morphology of the disease. Recent lesions of principally exudative character for the most part clear dramatically and more or less completely. Older lesions, associated with varying degrees of caseation necrosis, cavity formation, and fibrosis, respond less favorably and incompletely to chemotherapy. The statement may be made that the success of our present chemotherapy lies in its ability to (1) control recent exudative disease, (2) prevent further spread from caseonecrotic lesions, and (3) allow the body to proceed with its function of walling off and fibrosing the chronic nidus of infection.

Available studies from many sources to date indicate that variable chemotherapeutic regimens with presently available drugs, are very successful in achieving these objectives. Those regimens tested include daily SM with daily para-aminosalicylic acid (PAS); intermittent SM with daily PAS; intermittent SM with daily isoniazid (isonicotinic acid hydrazide, INH); daily INH with daily PAS; and intermittent SM with daily INH and PAS. Therapeutic differences among these regimens are slight, and probably depend on the pathologic type of tuberculosis under treatment. For ex-

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ample, patients with chronic disease with large cavities may respond more favorably to therapy with all three drugs,[1] whereas no such difference would be detected in the management of more acute, less destructive disease whether the treatment be SM-INH-PAS, SM-INH, SM-PAS, or even INH alone.

Regardless of regimen, however, two problems have not been solved: (1) the persistent cavity after treatment, and (2) the residual caseonodose lesion which almost invariably contains *Mycobacterium tuberculosis*. These may be seen readily on direct smear or tissue stain of the excised tissue. It appears, too, that with suitable technic a majority of such lesions yield organisms which can be grown.[2] There are as yet no extended follow-up studies to show how dangerous these caseous foci are after long-term drug therapy has been completed. Consequently, there is presently a sharp difference of opinion as to how vigorous one should be in the surgical removal of these residual lesions.

The persistent cavity poses less of a problem in the sense that the indication for surgical excision appears more clear-cut because persistent cavity with persistently positive sputum is synonymous with the eventual appearance of drug resistance of the organisms.[3]

It would seem then that there are two principal clinical objectives in the use of chemotherapy for pulmonary tuberculosis. The first would be cure of the disease by the use of drug therapy alone. This might be accomplished relatively readily if the lesion were of a suitable type as mentioned above, as, for example, in the patient with an early minimal lesion detected on a routine roentgenogram, or in the patient with the multiple exudative lesions of miliary tuberculosis. Or this objective of chemotherapy might be accomplished with difficulty over a long time, perhaps 2 or 3 years, in the patient with more chronic disease who for many reasons might not be suitable for surgical intervention. The second principal objective of chemotherapy would be to render the patient suitable for a necessary corrective operation, the need for which was obvious from the beginning or became apparent during treatment.

With these different objectives, drug combinations must meet different requirements, depending on the presenting clinical problem. A patient who is to have drugs for 12 months coupled with an operation to remove his focus of disease may be suitable for the very innocuous regimen of intermittent SM combined with daily INH, whereas the patient with more advanced disease involving both lungs who will require long-term chemotherapy without benefit of an operation will be a candidate for SM-PAS or INH-PAS, thus preserving sensitivity to one of the two best available drugs over a longer time.

In view of these factors, the following points may be made in the present limits of our knowledge without drawing serious objections:

1. That every patient with active pulmonary tuberculosis should receive chemotherapy.

2. That chemotherapy should be started as soon as possible, realizing that the longer a lesion exists prior to chemotherapy the less chance it has of being reversible.

3. That intermittent SM combined with daily PAS is effective treatment.

4. That, therefore, when a patient is seen with a reasonable diagnosis of pulmonary tuberculosis and after appropriate material for culture purposes has been secured, he should be started on treatment with SM-PAS to cover the period of delay that usually exists prior to his admission to a facility for the definitive treatment of his tuberculosis. This form of treatment will not be harmful and may be of considerable benefit to the patient.

Once initiated, the course of chemotherapy should be long. It is known from experience that short-term treatment, for example, from 4 to 6 months, is usually not adequate. This is known from relapse rates of treated patients, from the fact that chest roentgenograms continue to show improvement through at least 8 months of chemotherapy, and from the fact that patients who are operated on for residual lesions after 8 months or more of chemotherapy still show morphologic evidence of active disease. It is now commonly accepted, therefore, that any patient who is started on chemotherapy for tuberculosis will receive long-term treatment, of at least a year's duration. It is not presently known, although extensive current studies are in progress to try to determine, what the proper lower limit of duration of therapy is and what may be the proper upper limit.

CHEMOTHERAPY

Our presently available drugs, both well-tried and new, will be considered in the light of the previously mentioned facts. Any antituberculous drug must be considered in relation to three qualities: (1) its effectiveness against the *Myco. tuberculosis* in vitro, in the experimental animal, and in the human body; (2) the potential development of bacterial resistance to it and the clinical significance of this resistance; and (3) the clinical toxicity of the drug.

Streptomycin and INH are markedly potent agents; viomycin is moderately so, and PAS and terramycin (brand of oxytetracycline) have slight antituberculous effect. Pyrazinamide, an analogue of nicotinamide, must still be considered an experimental drug. It has some degree of effectiveness by itself, but is markedly effec-

tive in combination with INH. The newest drug available is cycloserine which is still in the early investigative phase.

Streptomycin. Streptomycin, when used alone and given daily, was found to be very effective, but this effectiveness was limited by the rapid development of organism resistance and by the high incidence of vestibular nerve damage. It was recognized that with the emergence of bacterial resistance, clinical effectiveness of the drug was lost, and deterioration of the patient ensued. Because of the vestibular toxicity, dihydrostreptomycin was introduced, and was found to be as effective therapeutically as streptomycin, and produced less vestibular damage. However, there was an alarming incidence of irreversible nerve deafness following the use of dihydrostreptomycin, and clinicians were left in the position of preferring a dizzy patient to a deaf one. Because this eighth nerve effect of the streptomycins seemed to be a function directly related to quantity used, more recently half-and-half mixtures such as duomycin, combistrep, or distrycin have been introduced. These preparations are still under investigation but appear to offer a solution to the problem of daily streptomycin therapy when it is indicated.

The next step in the evolution of streptomycin therapy was to give it every third day instead of daily. It was noted that the therapeutic effect of the drug was preserved, the incidence of toxicity was markedly diminished, and the incidence of bacterial resistance was reduced, but still remained about 33 per cent at 4 months (table 1).

TABLE 1. *Incidence of bacterial resistance in various trials with streptomycin alone*

Number of cases	Dose (grams)	Duration (days)	Percentage of patients with resistant bacteria at 120 days
100	2 daily	120	72
37	1 daily	120	67
21	1 daily	42	25
67	1 daily	28	5
28	½ daily	28	0
50	1 every third day	120	34
50	2 every third day	120	32

In a third series, 12 grams daily of PAS was added to intermittent regimen with streptomycin. The therapeutic effect was

obviously superior to that obtained with streptomycin alone and the incidence of resistance was reduced to zero at the end of 4 months.

However, the problem of PAS toxicity and patient intolerance for that drug was now added. Because of this, intermittent PAS therapy was tried in combination with intermittent streptomycin. The therapeutic response was good, but 29 per cent of those patients with positive sputum at the end of 4 months were resistant. Because this figure approximated that obtained with intermittent streptomycin alone, it was concluded that intermittent PAS therapy was not effective.

Intermittently used streptomycin combined with PAS daily was thus established as effective chemotherapy for pulmonary tuberculosis. One hundred and twenty-three patients with positive sputum and moderately advanced or far-advanced disease, were then treated for 8 months with this regimen. Of these, 94 per cent converted to persistently negative sputum cultures. Of the seven patients with positive cultures, one had organisms resistant to streptomycin (table 2).

In an extensive investigation of three SM-PAS regimens (1 gram daily SM-PAS; ½ gram daily SM-PAS; and intermittent SM-PAS) carried out by the Veterans Administration, no significant differences in therapeutic effectiveness were observed.[4,5] However, in studies of the British Medical Research Council it was reported that there was a definite reduction in number of *Myco. tuberculosis* resistant to INH at the end of 3 and 6 months of drug therapy when SM was given 1 gram daily rather than twice weekly in combination with 200 mg. of INH.[6]

Isoniazid. Isonicotinic acid hydrazide (isoniazid, INH) has now been under extensive laboratory and clinical investigation for 3 years. In the earliest clinical studies iproniazid (an isopropyl derivative of INH) was used more frequently than isoniazid, but because of its high incidence of toxicity it has been almost completely supplanted by isoniazid in clinical use. About half of the patients treated with iproniazid develop toxic symptoms, principally dizziness, but also many other symptoms such as muscle twitchings, blurred vision, and headaches, which will be severe enough to require discontinuation of the drug.[7] On the other hand, in a study of 170 patients at this hospital, clinical toxicity attributable to INH has been minimal. The one serious toxic effect reported has been peripheral neuritis, which is related to the dose of INH used. At 300 mg. of INH daily, peripheral neuritis is very rare, but as the dose is increased it becomes more frequent.[8] When high doses of INH are used the simultaneous administration of pyridoxine will prevent the occurrence of neuritis in most instances.

TABLE 2. *Roentgenographic and bacteriologic evaluation of combined SM-PAS-INH therapy*

Regimen	4 months			6 months			8 months		
	SM-PAS	SM-INH	SM-PAS-INH	SM-PAS	SM-INH	SM-PAS-INH	SM-PAS	SM-INH	SM-PAS-INH
Number of patients	147	122	104	146	110	98	123	93	96
Moderate or marked improvement	33%	39%	46%	58%	66%	69.4%	66%	80%	81%
Cavity no longer visible	26 of 103 or 25%	35 of 89 or 39%	29 of 71 or 40%	51 of 102 or 51%	51 of 82 or 62%	34 of 69 or 49.3%	55 of 90 or 61%	49 of 71 or 60%	40 of 62 or 64.5%
Negative sputum culture	129 (88%)	113 (93%)	97 (93%)	136 (93%)	105 (95%)	96 (98%)	116 (94%)	90 (97%)	93 (97%)
Positive sputum culture	18 (12%)	9 (7%)	7 (7%)	10 (7%)	5 (5%)	2 (2%)	7 (6%)	3 (3%)	3 (3%)
Sensitive	16	6	6	8	3	2	6	2	1
Resistant to SM	0	2	0	1	1	0	1	0	1
Resistant to INH	0	1	0	0	0	0	0	0	1
Not available	2	0	1	1	1	0	0	1	1

SM resistance defined as growth in 10 μg/ml. of culture media.
INH resistance defined as growth in 5 μg/ml. of culture media.

INH is a bacteriostatic drug, which is effective only against mycobacteria. At least in vitro, it is no more effective in massive quantities than in small quantities. The significance of this in the treatment of persons with tuberculosis is not yet known and is currently under investigation. The drug probably works by interference with the formation of an essential metabolite. Isotopic studies with C-14 labeled INH in the culture medium show that INH-sensitive organisms absorb and fix the INH, whereas INH-resistant organisms do not. It has also been shown that, in contrast to streptomycin or PAS, INH affects intracellular as well as extracellular bacilli.[9-11]

The therapeutic effectiveness of this drug when used alone has been gratifying, and it is believed that it possesses at least the same range of efficacy as streptomycin. However, the *Myco. tuberculosis* from the 54 per cent of the patients who had a positive sputum culture at the end of 4 months of therapy was resistant to 1 μg. of INH per ml., and that from 33 per cent was resistant to 5 μg. per ml.

This last fact leads immediately to one of the most important problems in the chemotherapy of tuberculosis: What is the significance of INH resistance? At first it was presumed that it had the same ominous significance as the appearance of resistance to streptomycin and ipso facto treatment with INH alone was supplanted by treatment with INH in combination with other drugs. It soon became known, however, that unlike streptomycin-resistant organisms, INH-resistant *Myco. tuberculosis* developed in vitro lost their virulence for guinea pigs. With further development of cultural technics it became apparent that this was also true of resistant mutants developed in vivo under INH therapy. This loss of virulence was then correlated with loss of catalase activity by the *Myco. tuberculosis,* and INH-resistant bacilli could be graded according to their catalase activity. It has been shown, for example, that strains resistant to 1 μg. of INH per ml., and even to 10 μg. per ml., that are still catalase positive, are at most only moderately attenuated for guinea pigs and will cause fatal tuberculosis after intravenous injection. On the other hand, catalase-negative resistant organisms do not produce lethal disease in the guinea pig. Quantitative studies of catalase activity related to pathogenicity for monkeys have been found to correlate in that INH-resistant, catalase-positive organisms were pathogenic and INH-resistant, catalase-negative organisms were not.[11] This emphasizes the important clinical proposition of producing INH-resistant, catalase-negative organisms rather than INH-resistant, catalase-positive organisms, although it has not yet been shown that such organisms have retained or lost their virulence for humans. Studies to elucidate the matter of INH resistance are currently being carried out as are other clinical studies on INH therapy alone.

The use of the combination of streptomycin intermittently and INH daily in 122 patients treated at this hospital produced additive therapeutic effects which equaled or slightly surpassed results obtained with SM-PAS therapy (table 2).

At this point a comment should be made with reference to the make-up of these series of patients. Although the patients were not selected and represent consecutive patients with positive sputum, and moderately or far advanced disease, yet they are in a sense selected by the fact that this is a military hospital. Therefore, these are for the most part young men in the prime of life with relatively recently acquired disease who have not had previous chemotherapy. If they were patients with more chronic disease, who had thick-walled cavities, or if they had had previous chemotherapy even though still streptomycin-sensitive, then we might expect a higher incidence of positive sputum cultures at the completion of 8 months of treatment. In such situations the clinical and bacteriologic studies of the U. S. Public Health Service indicate that the *Myco. tuberculosis* will become resistant to both streptomycin and INH within the relatively short period of 7 months. If these patients were not then suitable for surgical treatment this would represent a serious situation in that sensitivity would be lost to both major drugs. From the practical standpoint at this hospital the combination of SM-INH is an excellent therapeutic regimen, with very low incidence of toxicity, and will produce the desired clinical objective in almost all cases. It is recognized, however, that under other circumstances this may well not be the regimen of choice.

Because of the appearance of resistance to both major drugs when the combination of SM-INH is used, the U. S. Public Health Service has initiated studies in an attempt to find a therapeutic regimen as effective as SM-INH but one which would not result in the development of such resistance.[10] This study was designed specifically to: (1) find out if there is any advantage to using an increased dose of INH (10 mg. per kg. instead of 3 mg. per kg.); (2) evaluate the regimen INH-PAS; and (3) to determine if any benefit is to be derived from the simultaneous use of all three drugs, SM-INH-PAS. At the completion of 8 months of the study, observations indicate that increasing the dose of INH increases the incidence of drug toxicity, but does not increase its therapeutic effect. The combination of INH and PAS appears to have as good a therapeutic effect as SM-INH, with the obvious advantage of not having used streptomycin. The use of all three drugs simultaneously, from the therapeutic standpoint alone, seems to offer no advantage over the other regimens.

Recently reported results from the Veterans Administration's cooperative study are interesting in this regard. In a random comparison of INH-PAS, SM-INH, and SM-PAS in the treatment of

far advanced disease, there is a significant difference in bacteriologic conversion at the end of 8 months; 65 per cent of those treated with INH-PAS having converted; 57 per cent of those with SM-INH, and 49 per cent of those with SM-PAS. With reference to triple therapy as compared with the two dual regimens of SM-INH and SM-PAS, the only significant difference appeared to be the rate of bacteriologic conversion at 8 months, which was 85 per cent for those patients treated with all three drugs as compared with 45 per cent for those receiving the dual drug regimen.[1]

At this hospital a group of 96 patients had been treated with all 3 drugs for a period of 8 months. All had at least moderately advanced disease and all had positive sputum at the start of treatment. All patients were receiving treatment initially. Comparison with the previous regimens in terms of roentgenographic improvement, bacteriologic result, and the finding of *Myco. tuberculosis* in the caseonodose residual lesions on smear and tissue strain is shown in tables 1 through 3. The use of all three drugs did not appear to offer any particular advantage.[12]

TABLE 3. *Bacteriologic and pathologic findings in resected specimens from patients who received dual therapy and triple therapy*

	Dual	Triple
Positive for Myco. tuberculosis	69 – 93.2%	30 – 94.0%
Negative for Myco. tuberculosis	5 – 6.8%	2 – 6.0%
Caseonodose lesion	74 – 100%	30 – 94.0%
No caseous nodules found	0 – 0.0%	2 – 6.0%

In further consideration of the problem of INH resistance, a group of 16 patients were treated for 4 months with 300 mg. of INH daily combined with 2 grams of terramycin daily. These patients were selected on the basis of extensive disease with cavitation, so that the probability of their having positive sputum at the end of 4 months was increased. The sputum of 13 of these patients became negative by smear and culture in spite of the fact that only 2 of the 16 showed cavity closure. Of the 3 patients whose sputum remained positive, all were still sensitive to INH so that after 4 months of treatment there were no instances of INH resistance. These results, granted that the number of patients treated was small, contrast strikingly with the results of INH therapy alone for the same period of time.

Previous experience with terramycin as an antituberculosis drug had been reported from this hospital.[13,14] Because terramycin had been shown to have some degree of antituberculosis activity, both in vitro and in vivo, a group of 66 patients were

treated with 5 grams of terramycin daily in combination with intermittent streptomycin. The roentgenographic response was considered to be most favorable. At 4 months, sputum conversion had occurred in 77 per cent of patients. None of the positive cultures showed streptomycin resistance. Because of the mild, but troublesome gastrointestinal symptoms associated with the use of the 5-gram dose of terramycin, another group of 20 patients were given 2 grams of terramycin daily in combination with streptomycin. The therapeutic response was similar to that seen with the previous series. Sixty-five per cent of the patients obtained bacteriologic conversion. Of the seven patients who remained positive, one had developed resistance to streptomycin.

It would appear from these studies, and from others recorded in the literature,[15,16] that terramycin in combination with streptomycin intermittently is an acceptable and useful drug regimen for the treatment of active pulmonary tuberculosis in situations where the more accepted regimens cannot be used.

Viomycin has definite but less antituberculosis activity than streptomycin and is more toxic than streptomycin. Its toxicity, particularly renal, is sufficient to preclude its daily use, but when used on an intermittent combined schedule it has its place in the chemotherapy of tuberculosis, because it is effective against streptomycin-resistant organisms.[17-20] In evaluating the therapeutic efficacy of viomycin at this hospital, it was concluded that, used alone, it did not equal the effectiveness of streptomycin alone, and in a dose of 2 grams every third day approximated the efficacy of daily PAS alone. The combination of viomycin intermittently and PAS daily was more beneficial than either alone, both from the viewpoint of therapeutic response and the development of bacterial resistance. No patient developed persistent resistance to either drug. The combination of viomycin with streptomycin intermittently appeared to be the most effective regimen, approximating the results seen previously with the SM-PAS regimen. However, one patient did develop resistance to 10 μg. of streptomycin at the end of 4 months.[21]

Pyrazinamide. More recently pyrazinamide, an analogue of nicotinamide, has come under laboratory and clinical investigation in the treatment of patients with tuberculosis. It was found to be effective in the treatment of tuberculosis in guinea pigs, with a degree of effectiveness, when used alone, somewhere between that of streptomycin and PAS. It was then shown to have a beneficial effect in persons with tuberculosis, whether or not the *Myco. tuberculosis* in the patients were streptomycin-resistant. However, the duration of good response was short-lived and it was presumed that bacterial resistance developed rapidly when the drug was used alone. Unfortunately, it was not

possible to measure the sensitivity of *Myco. tuberculosis* to pyrazinamide by in vitro technic.

Extremely interesting laboratory and clinical studies on the combined use of pyrazinamide and INH have been reported recently.[22] Studies on mouse liver and spleen tuberculosis showed that this combination of drugs produced a much more eradicative effect on the disease than any other drug or combination of drugs. The clinical study by the same authors consisted of 81 patients who were treated with 50 mg. of pyrazinamide per kg. of body weight and 5 mg. of INH per kg. Of this group, 61 patients received pyrazinamide-INH for at least 3 months, with INH continued alone thereafter. Six of these patients (10 per cent) developed evidence of impairment of hepatic function; 4 of whom had jaundice and 3 of whom had severe hepatitis. Two of these last patients recovered, but one died of rapidly progressive hepatitis. Of 55 patients evaluated on the mentioned regimen, conversion of sputum on culture was accomplished and maintained in 90 per cent, substantial roentgenographic improvement occurred in 75 per cent, and cavity closure was observed in 65 per cent of those who had cavities. These results were attained in the first 6 months, with the exception of two patients whose cavity closure occurred later. There were no instances of progression of disease.

The problem of hepatic damage during clinical use of the drug is a frequent one. Of the original 43 patients treated by Yeager and associates[23] with pyrazinamide alone, 2 developed jaundice and had function tests of hepatic insufficiency. Both of these recovered. There were no other serious toxic manifestations. Campagna and associates[24] reported on the treatment of 21 patients with pyrazinamide-INH. Three of these patients developed mild jaundice which lasted for about a week. The liver function tests were not seriously altered in these patients, and the drug was not discontinued because the jaundice disappeared and no definite alterations in the liver function tests occurred. In a study reported by Phillips and co-workers,[25] 29 patients were treated with pyrazinamide. Eleven of these received pyrazinamide alone, and 18 in combination with other agents. One of the patients receiving pyrazinamide alone developed a toxic hepatitis with jaundice, which improved on discontinuation of the pyrazinamide. Of 20 other patients on whom liver function studies were done, five showed evidence of mild hepatic dysfunction as manifested by slightly elevated sulfobromophthalein retention. There were no other instances of clinical hepatitis except for the one mentioned.[25]

Schwartz and Moyer[26] reported their experience at Oteen with pyrazinamide. In a 2½-year experience with 181 patients treated

with pyrazinamide, either alone or together with PAS, streptomycin, or INH, they found it necessary to discontinue treatment in only 2 patients because of mild jaundice, which appeared at 2½ months and 5 months, respectively, of pyrazinamide-INH therapy. They found pyrazinamide-INH to be a very effective regimen in the chemotherapy of pulmonary tuberculosis. It was, in their opinion, at least the equal of any combination of streptomycin, PAS, or INH. In spite of the reported toxicity, the low incidence of jaundice encountered in their series prompted them to make the recommendation that pyrazinamide-INH be used more widely in the treatment of patients with tuberculosis, particularly in streptomycin-resistant cases.

Further studies with pyrazinamide are being carried out in view of its clinical possibilities. McCune and his group[27] have shown in mice that the combinations of pyrazinamide-streptomycin and pyrazinamide-PAS have shown an eradicative effect similar to pyrazinamide-INH. Morse[28] at this hospital has demonstrated a fascinating correlation between degree of INH resistance and pyrazinamide sensitivity. This phenomenon has been collaborated by Middlebrook.[29] A large-scale, controlled study by the U. S. Public Health Service[30] is under way to clarify the nature of the hepatic toxicity of the drug. The results of these studies should prove interesting as they emerge.

Cycloserine. The newest drug under investigation is cycloserine, which was reported at the 14th Conference on Chemotherapy of Tuberculosis in February 1955.[31] It is in an early phase of clinical and laboratory investigation so that no definitive statements may be made as to its clinical place. Peculiarly, it does not protect mice or guinea pigs infected with virulent *Myco. tuberculosis,* even though the results reported by Epstein and associates[31] indicated a definite effect in tuberculosis in humans resistant to SM and INH. Given in a dose of 1 gram daily, its most worrisome toxic effect is stimulation of the central nervous system with grand mal convulsions. The critical blood level above which this form of toxicity may occur, appears to be 50 μg. per ml.

CONCLUSIONS

For practical purposes a number of effective drug regimens are now available to treat pulmonary tuberculosis. Most patients treated at this hospital receive SM-INH intermittently, coupled with pulmonary resection when appropriate. SM-PAS or INH-PAS might be used with as good effect, but with a little higher incidence of drug toxicity or patient intolerance of the PAS. The circumstances under which it might not be elected to use SM-INH would be the presence of long-standing, far-advanced, cavitary disease in which curative surgical intervention would not be

anticipated. Here, it would probably be wise to use INH-PAS or SM-INH-PAS.

In those patients with resistant organisms who need chemotherapy, a number of alternate regimens have been suggested. The regimen to be chosen would depend upon a number of factors, especially the nature of organism resistance and drug availability.

Newer drugs are under investigation and it may be that still more effective drugs or combinations will be found in the near future.

Concepts have changed rapidly during the past few years, and they will probably continue to change, so that what may seem true now may appear quite antiquated in a short time. For example, it was proposed in the introduction that starting SM-PAS intermittently early is advantageous to the patient. This is true at present, knowing the method of treatment on which the patient will be continued to completion of his hospital care. But it may not be true next year, for it is not beyond conception that fundamental research may show that such treatment is inadequate, and inadequate treatment may allow the *Myco. tuberculosis* to adapt to its new environment.

Regardless of such speculation, however, the drugs available are powerful weapons against tuberculosis and used properly serve to reduce immeasurably the morbidity and mortality of the disease.

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SURGICAL WISHFUL THINKING

The diagnosis and definitive treatment of the cancer patient is, on the whole, the most responsible function of the surgeon. Cancer is one of the only diseases the surgeon is called upon to treat which is essentially 100 percent fatal untreated. If recurrence and death from cancer were immediate and dramatic, our sense of personal responsibility would be kept taut, but the time lag in the disease allows slackening, so that too often the surgeon takes the line of least resistance from the beginning, instead of the line of *most* resistance. The serious treatment and evaluation of cancer patients is a grim business, and not too many men are willing to do the follow-up in other than a casual fashion. Personal experience is an enlightening one, and much more salutary than reading someone else's statistics. Extrapolation of results, because of comparable surgical mortality rates, into the statistical salvage rates of leading clinical centers where serious study of the disease is carried out, is surgical wishful thinking.

—DANELY P. SLAUGHTER
in *Surgery, Gynecology and Obstetrics*
p. 771, Dec. 1954

EFFECT OF DELAYED WARMING ON EXPERIMENTAL FROSTBITE

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CARL G. HOAK, *Captain, USAF (MC)*

A NUMBER of investigators[1-7] have reported that immediate rapid thawing of frostbitten parts in experimental animals resulted in less gangrene than in controls spontaneously thawed in air.

The question arises whether rewarming must be performed immediately while the part is still frozen to obtain benefit, or if it can be delayed until after thawing has occurred.

This investigation was performed to determine the effect on the incidence and extent of cutaneous gangrene in frostbitten rabbit legs when rapid warming was delayed for various periods of time.

MATERIALS AND METHODS

The experiments were performed on 351 male albino rabbits of 2,000 to 2,500 grams body weight; 159 served as controls and 192 were treated. The animals were given a standard diet (Purina pellets) and allowed water *ad libitum* throughout the experimental periods. Freezing and thawing procedures were conducted in an air-conditioned room in which the temperature was kept constant during each experiment; the temperature varied day to day from 25° to 28°C.

Eleven separate experiments with adequate controls were performed. In five, rapid warming was delayed 30 minutes after freezing; in three the delay was 1 hour; in two, 2 hours; and in one, 4 hours.

One hind leg of each animal was prepared for freezing as follows: The hair was removed from midthigh to foot the day before the experiments by clipping followed by the application of a depilatory cream. Immediately prior to freezing, the depilated legs were covered with a thin layer of wool fat followed with rubber condom boots. The boots were secured at the ankle with narrow strips of adhesive tape following which air was milked

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out of the boot to obviate air pockets which would alter thermal conductivity. The top of the boot was then fixed to the lower thigh by means of circularly placed adhesive tape and a pencil mark was made at the lower tip of the femur to designate the depth of immersion in the freezing bath. The freezing bath consisted of a tank of ethyl alcohol-dry ice mixture, which was kept in constant motion by means of electric stirrers. The temperature of the bath was not allowed to vary more than 0.5°C during the exposure times.

In all experiments, the exposure time was 30 minutes. The temperature varied from −15° to −18°C in different experiments to produce varying degrees of skin injury. The animals were anesthetized with Pentothal Sodium (brand of thiopental sodium) during cold exposure.

Rapid warming was accomplished by immersing the cold-injured legs in warm water at a temperature of 42°C for 5 to 8 minutes.

After warming, the injured legs were dressed with Sulfamylon ointment (brand of mafenide (4-aminoethylbenzenesulfonamide HCl)) and gauze. The dressings were changed daily until the end of the experimental periods, which varied from 6 to 9 days in different experiments. The rabbits were then sacrificed, and the incidence and extent of skin necrosis were determined. The technic for quantitative measurement of skin gangrene has been described in another article.[8] Animals which died close to the end of the experimental periods with sharply demarcated areas of necrosis were included in the evaluations.

The statistical analysis of the results was performed as follows: For each experiment the Mann-Whitney nonparametric test was used to evaluate the difference in areas of skin necrosis between treated and control animals. From the individual P values obtained, a combined P value was computed for each specific rapid-warming delay time.

Modified "t" tests were used to determine the significance of differences in incidence of skin gangrene between treated and control animals.

RESULTS

The results are summarized in table 1. In experiments (I-V) in which rapid warming was delayed for 30 minutes, the extent and incidence of skin gangrene were significantly less than in controls spontaneously warmed in air ($P > .01$ and $P > .003$, respectively).

When the rapid warming was delayed for 1, 2, or 4 hours (experiments VI-XI), the results did not show statistically signifi-

TABLE 1. *Effect of delayed rapid warming on skin necrosis in rabbits following cold exposure for 30 minutes*

Experiment number	Time between freezing and rapid warming	Exposure temperature (°C)	Number of animals			Average skin necrosis (sq cm)	Number with skin necrosis	Survival time (days)*
			Exposed	Died	Evaluated			
I	30 min	−16	T 16 C 15	1 0	15 15	7.8 ± 2.1 22.0 ± 3.5	12 14	7
II	30 min	−15	T 17 C 17	0 0	17 17	2.2 ± 1.8 7.0 ± 2.4	5 9	7
III	30 min	−15	T 20 C 20	9 15	11 5	30.8 ± 1.9 55.3 ± 9.6	11 5	8
IV	30 min	−15	T 20 C 20	4 5	17** 15	7.9 ± 2.5 25.8 ± 4.0	14 14	8
V	30 min	−15	T 23 C 22	7 10	16 13**	14.4 ± 3.8 26.2 ± 4.5	10 12	9
VI	1 hr	−18	T 15 C 15	1 2	15** 13	21.9 ± 3.6 35.3 ± 4.0	14 13	7
VII	1 hr	−16	T 16 C 18	0 1	16 17	15.8 ± 2.4 15.0 ± 2.6	15 14	7

TABLE 1. *Effect of delayed rapid warming on skin necrosis in rabbits following cold exposure for 30 minutes*—Continued

Experiment number	Time between freezing and rapid warming	Exposure temperature (°C)	Number of animals			Average skin necrosis (sq cm)	Number with skin necrosis	Survival time (days)*
			Exposed	Died	Evaluated			
VIII	1 hr	−16	T 16 C 15	3 0	14** 15	22.9 ± 5.0 22.0 ± 3.5	10 14	7
IX	2 hr	−16	T 16 C 18	0 1	16 17	16.3 ± 3.0 15.0 ± 2.6	14 14	7
X	2 hr	−17	T 16 C 14	0 0	16 14	27.3 ± 2.3 33.1 ± 2.1	16 14	6
XI	4 hr	−17	T 17 C 14	1 0	17** 14	29.7 ± 2.6 33.1 ± 2.1	17 14	6

T = treated animals; C = control animals.
*All animals were sacrificed.
**Animals which died near the end of the experimental period with well demarcated areas of necrosis were evaluated.
Experiments I and VIII were performed on the same day using the same control animals.
This was true also for experiments X and XI.

cant improvement with regard to either the incidence or extent of skin necrosis when compared with controls.

In three experiments (VI, VII, and VIII) in which warming in water was delayed one hour, one showed a statistically non-significant decrease in the extent of gangrene in treated animals and in the other two the treated and control animals behaved almost identically. For all three, the combined P value was about 0.30. The P value for the difference in the incidence of gangrene between treated animals and controls for the three groups was 0.4.

Experiments in which rapid warming was delayed two hours (IX and X) gave results for which the computed combined P value for the difference in extent and incidence of gangrene was 0.2 and 0.7, respectively.

Delay of rapid warming for four hours in one experiment (XI) resulted in an incidence of gangrene of 100 per cent in both treated and control animals and the extent of gangrene was almost the same in the two groups (P = 0.3).

The observation that the death rate and extent of cutaneous gangrene varied considerably in different experiments, conducted under the same conditions but on different days, is not explainable but has been noted many times by the authors in past experiments with cold injury.

DISCUSSION

The results of the present investigation indicate that skin necrosis can be decreased when the rewarming procedure is delayed as long as 30 minutes. Delay of one hour or longer failed to prove beneficial in these experiments, although Entin and Baxter[4] reported decreased gangrene after immersing frozen rats' feet in warm water following delay up to one hour after freezing. In their experiments, waiting 2 and 3 hours to rapidly warm gave results which were not better than in controls thawed in air.

It is reasonable to assume that the same results would be obtained from delayed warming of cold-injured parts in man.

Entin and Baxter found that 6 to 10 minutes were required to air-thaw rats' legs following exposure to a bath at -30°C for 12 to 30 seconds, but the original tissue temperature was not attained until 40 to 60 minutes had elapsed. In our own experience,[9] deep leg temperatures in rabbits remained subnormal for 2 hours or longer after 30 minutes' exposure to freezing or even non-freezing cold baths.

These observations indicate that damage to tissues is produced not only during the time of solidification from cold, but that the

injurious process continues until tissue temperatures approach normal. Such a conclusion should not be surprising when one realizes that above-freezing cold can cause gangrene and less severe pathologic changes in both humans and experimental animals in so-called "trench foot" and "immersion foot or leg."

It, therefore, would seem to be of considerable practical importance not only to rapidly thaw frozen parts but also to continue the warming until the parts reach normal body temperature. Care must be taken, however, not to overheat the injured tissues, causing burn injury. Relatively mild degrees of overheating have been shown to produce tissue changes in rabbit legs.[10]

Furthermore, it would also seem important that rapid warming be instituted even after cold-injured parts have thawed, because one cannot always be certain that the cold intensity or exposure time or both have been sufficiently great to preclude the saving of tissue.

It is apparent that, other things being equal, the benefit obtained from rapid warming will vary indirectly with the length of time the tissue is exposed to cold, either in the cooled or frozen state.

The manner by which rapid thawing of parts frozen by relatively short exposure to cold produces improvement is not known. It would seem that the lessening of the exposure time to cold by the application of heat is the main and perhaps the entire reason for benefit.

SUMMARY AND CONCLUSIONS

In five experiments, frozen rabbit legs thawed in air at room temperature for 30 minutes, and then rapidly warmed for 5 to 8 minutes in warm water (42°C), developed significantly less gangrene than controls similarly frozen but thawed only in air. Benefit was not obtained when the rapid warming in water was delayed for 1, 2, or 4 hours after freezing. These observations indicate that damage occurs not only while the parts are frozen but also during the post-thaw period before the tissue temperatures reach normal.

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OPEN TREATMENT OF BURNS

The aim in severe burns is to protect the burned area against infection, to prevent loss of fluids and absorption of toxins, and to avert loss of function and production of deformity. Treatment must be instituted promptly and burns given the same priority demanded by any serious emergency. Many investigators stress the treatment of the general condition, which is important, but it is imperative to remember that the local condition is the primary aggravating factor. It has been found that duration of illness and mortality in burn cases are considerably reduced when treatment is under unified control. There are many important advantages to the open method of treatment: greater ease of dressing than in some methods; no anesthetic necessary for dressings; debridement facilitated; constant wound evaluation, so that grafting can be done at the optimum time; active and passive motion can be started early, and drainage is promoted.

—G. KENNETH LEWIS, M. D.
in *Postgraduate Medicine*
p. 31, Jan. 1954

POTENTIAL REVERSIBILITY OF THE HEMIPLEGIC GAIT

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RAOUL C. PSAKI, *Lieutenant Colonel, MC, USA*
ERNST DEHNE, *Lieutenant Colonel, MC, USA*

DESPITE an increased interest in the rehabilitation of patients with spastic hemiplegia, there is no objective evidence that significant improvements in technics of muscle retraining have resulted. Walshe's[1] description of spontaneous recovery to the level of an extensor leg still seems to be an adequate portrayal of the end result of present retraining methods. In obvious contrast have been the steady advances in the convalescent care of patients with paralytic poliomyelitis. It seems to us that many of the more recent improvements in poliomyelitis care have resulted from Bennett's[2] analytic approach. His inquiries into the dangers of precipitate ambulation and his insistence on attention to small details in therapy have contributed greatly to the reduction of deformities and to the restoration of improved functional abilities. Inherent in the Warm Springs philosophy is this emphasis on careful observation and attention to small details.

In an effort to apply some of these principles to the management of patients with spastic hemiparesis, we have followed the pattern of motor recovery in a series of 125 patients, and have observed the influence of various physical therapy procedures on this pattern. Each of these patients has been examined repeatedly throughout the cycle of recovery by one of us (WJT). This series represents a consecutive sample of patients referred to the physical medicine service of this hospital. It needs to be emphasized that this study was performed under ideal conditions, particularly in respect to the co-operation received from our colleagues in internal medicine, orthopedics, and neurosurgery.

MATERIAL

Of the 125 patients studied, 83 were males and 42 were females. In age, these patients ranged from 4 to 80 years, with a distribution spectrum as shown in table 1. It is apparent from

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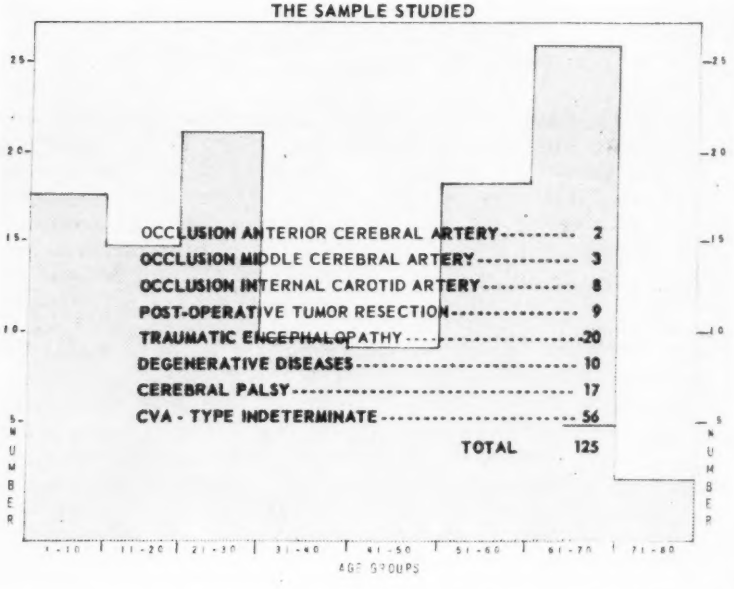
this figure that the sample is weighted nearer the median age group than a series from a civilian hospital would be. Spastic hemiparesis occurred in 63 patients who were under 30 years of age, and from this group came a high proportion of the patients who showed maximal motor recovery.

TABLE 1. *Distribution of 125 hemiplegic patients by age and causative factors*


THE SAMPLE STUDIED
OCCLUSION ANTERIOR CEREBRAL ARTERY ---------- 2
OCCLUSION MIDDLE CEREBRAL ARTERY ---------- 3
OCCLUSION INTERNAL CAROTID ARTERY ---------- 8
POST-OPERATIVE TUMOR RESECTION ---------- 9
TRAUMATIC ENCEPHALOPATHY ---------- 20
DEGENERATIVE DISEASES ---------- 10
CEREBRAL PALSY ---------- 17
CVA - TYPE INDETERMINATE ---------- 56
TOTAL 125
NUMBER
AGE GROUPS

The causative factors productive of hemiparesis are also summarized in table 1. As is more or less inevitable, cerebrovascular accidents of unknown causation and uncertain location were numerically the most significant. However, the increasing employment of angiography as a diagnostic aid was reflected in the location of the vascular disease in 13 patients. Recovery in two of the patients with occlusion of the middle cerebral artery has already been described in detail in an article by Rosegay and Welsh.[3] Angiograms revealed that thromboses adjacent to the carotid syphon were productive of hemiparesis in eight patients. That this relatively new syndrome should have been recognized so frequently in this small series of patients was due to our neurosurgical colleagues' keen awareness of the syndrome. Thrombosis at this site occurred spontaneously in seven patients and followed trauma in one other patient. Cortical damage, localized chiefly in the frontal and parietal lobes, was the result of missile entry in 12 patients and of concussion following auto-

mobile accidents in eight others. Classified as having degenerative disease were seven patients whose referral diagnosis was multiple sclerosis, and three others with the diagnosis of amyotrophic lateral sclerosis. Deliberately, we selected only those cerebral palsied children in whom the signs of an upper motor neuron deficit were confined to one side of the body. Employment of this criterion necessitated the exclusion from this report of a large number of children with spastic triplegia (in our experience, the commonest form of cerebral palsy).

From study of the levels of motor recovery which these patients achieved, we attempted to find answers to two large questions. First, we sought to define the individual components of the hemiplegic gait. Second, we sought to determine what forms of physical therapy influenced the gross appearance of this gait.

THE HEMIPLEGIC GAIT

Postural hypertonus

Expressed in Jackson's[4] terms of a dissolution of higher functions, the hemiplegic gait can be described as "evolution not being entirely reversed, some level of evolution is left." Motor recovery occurs in a highly selective fashion, appearing earliest in the "prop muscles" of the leg, namely the extensors of the knee and ankle. Conversely, there is a relative hypotonia in the antagonistic flexors of the knee and dorsiflexors of the foot. Evidence of hyperactive postural muscle groups was found in all but 2 of the 125 patients in this series. It was seen earliest and persisted longest in those patients who were ambulated early. Clinically, it was reflected in the contrast between the patients' ability to extend the knee strongly through a wide arc of movement and their inability to flex the knee when in the prone position. There was also an obvious imbalance between strongly contracting plantar flexors and paretic dorsiflexors of the foot. Seventy-nine of these patients held the foot in a position of equinovarus, and four patients exhibited a persistent position of equinovalgus. More rapid restitution of motion in the flexor groups was seen in but two patients, both of whom had been confined to strict bed rest by reason of concomitant systemic diseases.

"Lateral leg" asynergia

A phenomenon of delayed return in the laterally placed muscles of the lower extremity was observed in the great majority of patients. As a result of this, there was gross impairment of synergic contraction of the internal rotators of the hip, of the biceps femoris, and of the muscles producing the movement of dorsiflexion in eversion (fig. 1). Restoration of this total synergy was observed in only 23 patients. It was our opinion that this dys-

synergia was a major factor in the causation of the dysmetria which was observed in almost all patients, as performance of the heel-knee test was seen to improve concurrently with correction of the imbalance between internal and external rotators of the hip. Likewise, we found that restitution of the movement of dorsiflexion in eversion was by far the most reliable indication of advanced functional return about the foot.

Figure 1. Patient with lateral leg asynergy. There is a decrement in performance of hip internal rotation and of foot dorsiflexion on the right side.

Delayed return in proximal muscles

Persistent weakness in proximal muscle groups was seen in all patients. This phenomenon could be observed critically only in those patients who had recovered spontaneously to a considerable degree, because in more severely involved patients the obvious weakness in proximal groups could not be studied sepa-

rately from generalized weakness throughout the limb. Gross evidence of weakness in proximal muscles was seen in the persistence of a Trendelenburg limp until very late in recovery, and in the poor performance of the movement of abduction at the hip joint (fig. 2). Satisfactory volitional control of hip flexion was observed only following corrections of the imbalances between the rotator muscles and between the abductor and adductor groups. Clinically satisfactory function of the hip musculature occurred only when there was restitution of considerable voluntary power in the gluteus medius. A rating of normalcy was given

Figure 2. Patient with proximal paresis. Note diminished range of abduction on the right side.

when no decrement, in either range or strength, could be detected in the performance of the movements of hip abduction and of internal rotation.

Genu recurvatum

The occurrence of an apparent genu recurvatum in 47 patients could not be explained on the basis of any, or all, of the foregoing observations (fig. 3). A frequent finding in these patients with genu recurvatum was their inability to extend the leg com-

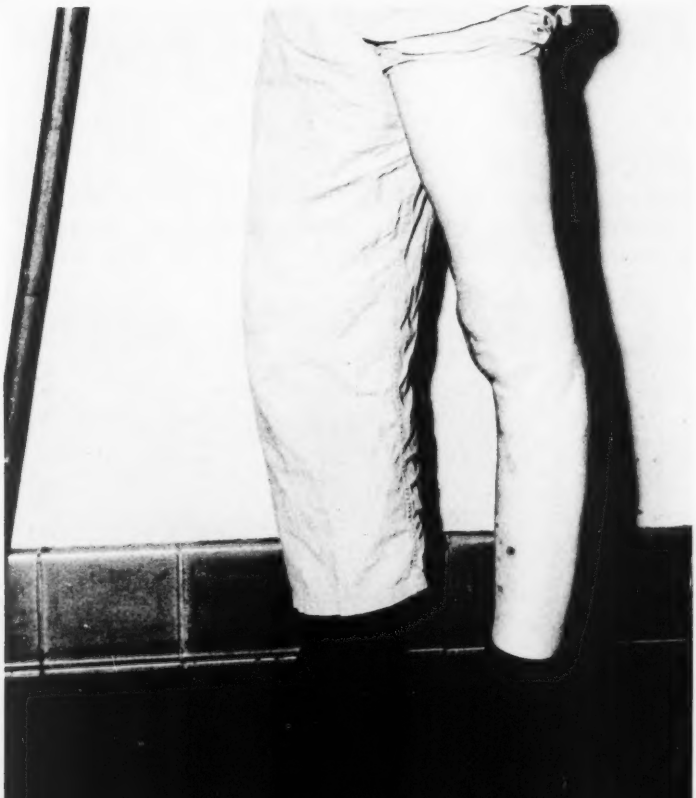


Figure 3. Patient with genu recurvatum.

pletely at the knee, especially when the hip joint had previously been placed in flexion. Likewise, they were observed to perform the movement of knee extension more slowly, and in a less rhythmical manner, on the paretic side. Incriminated in the production of genu recurvatum were paresis of the vastus medialis and the rectus femoris, and over-activity of the gastrocnemius muscles. The presence of "backknee" was usually made clinically more pronounced when patients attempted to walk on their heels. It was our experience that this deformity was persistent, and even progressive, unless preventive or corrective measures were adopted.

ALTERING THE HEMIPLEGIC GAIT

Rigid control of ambulation

Ambulation with the limb suitably splinted was encouraged throughout the stage of initial generalized hypotonia and until the extensor muscles were able to support the body weight. However, ambulation was severely curtailed throughout most of the remainder of the recovery cycle, certainly until a balance between the strength of flexor and extensor activity had been achieved. Our reasons for attempting this radical departure from usual treatment methods have been outlined in a previous report.[5] In a special study group of 21 patients, it was very obvious to us that this policy was the most important factor in shortening the time needed for recovery of the flexor synergy. During this phase of curtailed ambulation there was no slackening in the tempo of nonweight-bearing resistance exercises directed specifically toward retraining of the flexor groups. Ambulation was permitted when it appeared that the flexor muscles had recovered sufficient strength to permit their competing successfully with the opposing extensor muscles. As a rule, this condition was satisfied when the patient could, during stance, flex the knee fully without any concomitant flexion at the hip.

Selective re-education

In keeping with the policy of reducing afferent stimuli to the postural muscles, emphasis was given to retraining of the flexor synergy. At first, painful stimuli were combined with manual resistance to reinforce the response of synergic withdrawal in all the flexors. Later, re-education exercises were prescribed for individual flexor muscles of the knee, foot, and hip joints in that sequence. Particular care was given to the restitution, by resistance exercises, of strength in the biceps femoris and the long extensors of the toes. Prior positioning of the thigh in internal rotation was also found helpful in increasing the amplitude of contraction in these muscles.

Retraining of motion about the hip was also undertaken in a selective fashion. Initially, hip abduction was reinforced by simultaneous spine extension and by traction on the leg. Insistence on bilateral contractions, performed in a prone position, obviated much of the danger arising from the performance of hip abduction by muscles extrinsic to the hip joint. The tendency of patients to perform hip flexion with the femur held in external rotation also had to be guarded against. For this reason, resistance was applied to contracting hip flexors with the femur held in a position of moderate internal rotation. Retraining of the movement of hip extension was attempted several weeks after the movements of hip flexion and abduction.

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It appeared to us that the usual routine of resistance exercises for strengthening of knee extensor muscles did not materially increase the patients' ability to perform terminal extension. Because this deficit persisted until the last stages of recovery, no attempt at early correction was made. During re-education of this movement, weight-bearing was again temporarily curtailed, extension was performed in a gravity-eliminated position, and was attempted initially only through a small arc of motion. In the majority of patients, increments in range and strength occurred pari passu with increases in the bulk of the vastus medialis. During this phase of re-education, protection was provided for the knee joint by the application either of a long leg brace with an "offset" joint or of a "knee cage."

Chemical nerve blocks

To permit more accurate assessment of residual strength in relatively hypotonic groups, we have employed, with increasing frequency, a technic of blocking conduction in the nerve trunks supplying the stronger antagonistic extensor muscles. This procedure has been of inestimable value in determining the rehabilitation potential of individual patients, and also as a guide to the potential benefits of surgical interruption of these nerves. Because we experienced considerable difficulty in isolating peripheral nerves when using standard methods of infiltration with an anesthetic agent, an adaptation of a technic described by Sarnoff and Sarnoff[6] was devised by one of us (RBP). A square wave pulse, whose characteristics are depicted in figure 4, was applied to the uncoated tip of an otherwise insulated hypodermic needle. Using variable voltages, it was possible to approximate the needle tip to the nerve by observation of the strength of response in the muscles supplied by the stimulated nerve. As the needle tip became more closely applied to the nerve, steadily diminishing voltages were required to produce a motor response. When a pulse of from 0.5 to 1.0 volt produced a perceptible contraction in the muscle, the local anesthetic, a 1 per cent solution of xylocaine (brand of lidocaine hydrochloride), was injected (fig. 4).

With this method of approximating the needle-tip to the nerve, as little as 5 ml. of the anesthetic agent has been sufficient for complete conduction block in even the largest peripheral nerve trunks. We were even able to confirm the fact of intraneural placement of the needle in some of the operated patients. Following complete block, a fresh assessment of the function of the previously hypotonic "unblocked" muscle group was undertaken. If increased volitional contraction was observed, we felt justified in continuing a program of muscle retraining directed specifically toward retraining this group. If, even following the

application of an adequate "reinforcing" stimulus for this group, there was no worthwhile improvement in contraction following block, we presumed that there had been long-standing "decay" of this function, and that prolonged and expensive retraining could not be justified. This technic of conduction block was also found useful as a means for determining whether extensor overactivity at either the knee or the ankle was primarily incriminated in the production of the hemiplegic gait.

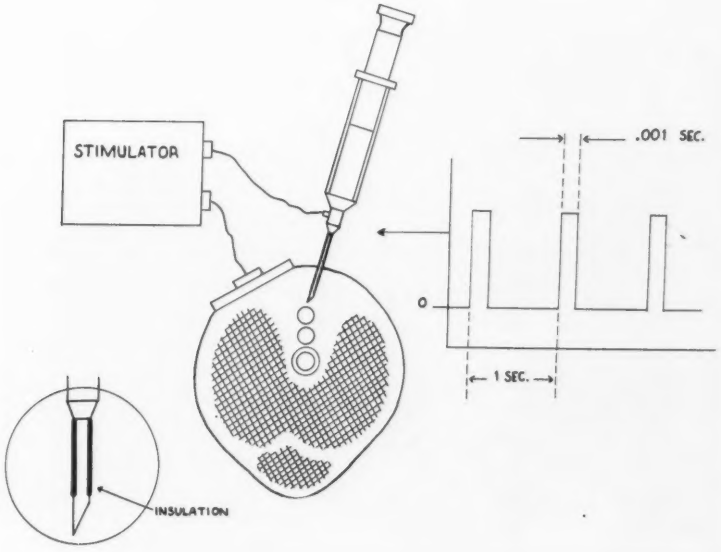

Figure 4. The nerve stimulator.

Surgical interruption of nerve conduction

When a satisfactory increment in the strength of the flexor muscles was observed to follow anesthetic block of the nerve to their antagonists, the possibility of surgical neurotripsy was considered. To date, a total of 29 such operations have been performed. Statistical analysis of the results of these procedures is being undertaken and will be presented in subsequent communications. Following surgical neurotripsy, intensive re-education of the flexor groups (in our hands, chiefly the dorsiflexor muscles of the foot and the flexors of the knee) became easier to perform and more enduring in its benefits. Also, after reduction or elimination of the strong plantar thrust and clonus at the ankle, braces could be either dispensed with entirely or greatly reduced in

weight. Furthermore, in three patients there was a gratifying reduction in the amount of "backknee" after crushing of the tibial nerve branches to the overactive posterior calf muscles. Neurotripsy, or interruption of conduction by the application of pressure to the nerve, and, in three patients, transection and immediate suturing were chosen in preference to extirpation neurectomy because of the reversibility of the block by the former means. The branches to the muscles were identified with the aid of a stimulator and were crushed at the furthest possible distance from the point of their entry into muscle (fig. 5).

Figure 5. Roentgenogram showing tantalum markers placed at site of interruption and at entrance of nerves into muscles.

We have not attempted blocking of conduction by alcohol injections because of the disadvantages of topical anesthesia produced by such blocks. Actually, surgical interruption was chosen because we were chiefly interested in the reduction of proprioceptive impulses from hyperactive muscle groups. It has

been amply illustrated that fibers carrying these impulses are as susceptible to mechanical blocking as the large diameter "motor" A fibers. The only difficulties we encountered following operation were wound infections in three patients and a too early return of function in two other patients because of insufficient pressure.

DISCUSSION

Van Buskirk[8] recently described his observations on the mosaic of motor recovery in hemiplegia, particularly "as related to the learning of simple motor activity." The present study could be described in similar terms. Spontaneous recovery, occurring within the first 2 to 3 months following onset, accounted for most of the functional gains in our experience also. It was apparent, however, that the extent and rate of spontaneous recovery could be significantly altered by more careful control of afferent influences acting on spinal integrator systems. Limitation of standing and selective retraining of flexor activity were seen to result in an earlier restitution of the gross flexor synergy and of volitional control over individual flexor muscles. Expressed in Knowlton's[9] terms, temporary "decay in certain existing patterns" of extensor activity was sought, in order to prevent later permanent "decay" of opposing flexion. Similarly, the practice of blocking nerves by chemical or mechanical means was designed to lessen the danger that the weaker muscle might be "ignored" in the performance of motion patterns.

This type of retraining program was based on two physiologic hypotheses. First, our observations on spontaneous recovery convinced us of the validity of Sherrington's[10] concept of selective synaptic resistance. Thus, it was apparent that most afferent impulses were relayed with much greater facility to motoneurons controlling extensor muscles. In the state of increased central excitation prevailing following reduction in descending inhibitory relays, minor stimuli were seen to evoke disproportionate motor responses in these extensor groups. Conversely, it was always found difficult to produce an adequate afferent stimulus for activation of flexor motoneurons.

Second, there was ample evidence in this study of the existence of opposing half-centers in the spinal cord, that is, of an arrangement of motoneurons into antagonistic flexor and extensor groups. Following chemical conduction blocks, we observed certain alterations in strength of muscular contraction which could most readily be explained on the basis of this theory of half-centers. The decrements in quadriceps contraction which followed obturator and tibial nerve blocks led us to the conclusion that proprioceptive feed-back from the plantar flexors of the foot, from the knee extensors, and from hip adductor muscles

were all relayed to a common extensor (postural) motoneuron pool. Because the express purpose of surgical intervention was the reduction of a known amount of afferent return from these muscle groups, nerve operations were preferred to procedures on the end-organ, such as tendon lengthening.

These observations do not allow a conclusion, such as Foerster[11] made 40 years ago, that the factors influencing the pattern of recovery were entirely external. Neither do they support Walshe's[12] contention that the incidence of spasticity, and hence the attitude of the limbs, are determined almost completely by internal factors. It appears to us that too little attention has been paid to the control of external afferent influences, particularly those arising from receptors in antigravity muscles. The hypothesis of a potential reversibility of the hemiplegic gait is based on the alterations in performance that we have observed to result from an increased attention to the role of such afferent influences.

SUMMARY

The individual components of the hemiplegic gait have been analyzed and described under the headings of postural hypertonus, asynergia of laterally placed muscles, delayed return of proximal groups, and genu recurvatum. Among the measures suggested for improvement of the gait have been limitation of ambulation, selective retraining of flexor muscles, and chemical and mechanical blocking of the nerves supplying the extensor groups. The hypothesis of potential reversibility is based on observations made on the patterns of motor recovery in a series of 125 patients. It was supported by improvements in the extent and speed of recovery which followed closer attention to the control of proprioceptive afferent stimuli.

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LACK OF JUDGMENT CAN BE LETHAL

It is a surgical truism that few patients are killed by lack of technic, whereas lack of judgment has often been lethal. Perhaps the most dangerous surgeon is the one with facility and so-called courage who lacks judgment. Today's surgical training programs are often evaluated only by the number and variety of cases done by the residents. Indications and judgments exhibited are frequently neglected. How much more revealing would be a listing of patients spared surgery after proper observation and precise etiologic diagnosis. Narrow specialized training programs in the surgical subspecialties, without the requirements of basic general surgical background, have produced many skillfully trained specialty technicians who are at a loss when confronted with general surgical problems, as they might well be in smaller communities.

—LEON G. BERMAN, M. D.
in *New York State Journal of Medicine*
p. 3425, Dec. 15, 1954

THE WECHSLER-BELLEVUE SCALE IN CLINICAL DIAGNOSIS

Some Aspects of Its Use in Clinical Diagnosis

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THE PRIMARY purpose in administering any intelligence scale, obviously, is to arrive at a valid measure of an individual's level of intellectual functioning. In the past, however, as the intimate relationship existing between intelligence and personality gained increasing recognition, psychologists began to devote more attention to the manner in which various patterns on intelligence tests could be used in gaining new insights about the patient's personality. Accompanying this trend there has also been a resurgence of interest in intelligence tests with a view toward discovering the type of strengths and weaknesses which patients suffering from organic brain disease characteristically display.

One of the intelligence scales which has been found most suitable and therefore has been used most frequently for differential diagnostic purposes is the Wechsler-Bellevue Scale. This instrument lends itself readily to various types of analyses as it includes a number of verbal tests and a number of performance tests, yielding two separate quotients. Furthermore, the relationships between the scores on the various subtests can be analyzed so that any patterns, if there are such, which are characteristic of the different diagnostic groups can be ascertained.

The most obviously useful feature of the Wechsler-Bellevue Scale is its division into verbal and performance sections. There is a belief widely held among clinicians that the difference between verbal and performance sections, especially if large, is of diagnostic significance. Wechsler[1] himself contends: ". . . the general finding is that in most mental disorders impairment of functioning is greater in the performance than in the verbal sphere." He proceeds to explain that this conclusion applies to patients with psychosis or organic brain disease and to most psychoneurotics.

The more sophisticated methods of test analysis involve an examination of subtest scores. One commonly employed technic for differentiating between patients with cerebral lesions and

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those with psychoneurosis is Hewson's[2] pattern of deviation ratios. In applying this method, one computes a series of ratios by comparing certain of the Wechsler-Bellevue weighted subtest scores with certain others. Hewson has demonstrated on an empirical basis that these ratio scores discriminate between the two groups fairly accurately. Depending on the resulting ratios, one can conclude that the distribution resembles that frequently obtained in association with a cerebral abnormality, an emotional disturbance, or with neither of these.

PURPOSE

The present investigation had a fourfold purpose. First, I wished to ascertain whether the organic, convulsive, and psychogenic groups differed in intelligence on the full, verbal, or performance scales of the Wechsler-Bellevue. Second, it was intended to establish whether large discrepancies between ratings on verbal and performance sections on the Wechsler-Bellevue Scale discriminated among patients of the three groups. The third aim was to evaluate the usefulness of the Hewson method with these patients. Finally, I wished to determine whether the level of accuracy in making differentiations is greater when psychologic impressions are based on a whole battery of tests or when they are based only on the Wechsler-Bellevue Scale.

METHOD AND SUBJECTS

All the patients used in the present study were referred to the psychology department of Neurological Institute, Columbia-Presbyterian Medical Center, New York, N. Y. In many cases organic brain damage was suspected by the referring neuropsychiatrist, but there was often considerable doubt about the most probable diagnosis. A variety of laboratory procedures, including roentgenograms of the skull, electroencephalograms, pneumoencephalograms, et cetera, were usually performed. The psychologic tests were administered and interpreted by qualified psychologists. A typical battery of tests included the Wechsler-Bellevue Scale, Form 1, the Substitution Test, the Bender-Gestalt Test, projective drawings, and the Rorschach Test. There was considerable flexibility in choice of tests, and occasionally additional instruments such as the Thematic Apperception Test were employed.

The data with which this report concerns itself were collected independently and prior to knowledge of the patients' discharge diagnoses. The latter were made by members of the medical staff who used all the pertinent information at their disposal. It should be emphasized that the psychologists' impressions concerning the presence or absence of organicity were based solely on their observation of patients and their interpretation of test results.

Table 1 contains information pertaining to the distribution of the three groups by age, sex, and intelligence. It will be noted that there are large age and sex differences in these groups. However, since there is no reason to believe that differences in sex have any significant effect on the dependent variables, no attempt was made to equate for sex.* As for the age differences, which are in all cases significant at the 1 per cent level of confidence, the methods used in computing Wechsler-Bellevue quotients and Hewson ratios in effect make allowance for age differences.

TABLE 1. *Composition of the three groups*

	Group		
	Organic (N = 91)	Convulsive (N = 35)	Psychogenic (N = 49)
Sex			
Male	57	14	23
Female	34	21	26
Age			
Range	12-72	12-56	12-64
Mean	44.1	27.6	35.4
S. D.*	15.1	11.9	14.2
W-B total I. Q.			
Range	54-129	61-121	79-136
Mean	90.8	94.2	110.8
S. D.	16.7	15.4	13.1

*Standard deviation

The organic group is composed of 91 patients, all having some type of intracranial abnormality. Although efforts at classification were difficult and at best unsatisfactory, the following broad and arbitrary subgroups may be distinguished:

23 with brain tumors (11 proved histologically)

16 with vascular lesions (including aneurysms, subarachnoid hemorrhages, arteriosclerotic disease, and encephalomalacia)

4 with infectious diseases (syphilis and encephalitis)

15 with head trauma (all types including surgical)

27 with degenerative diseases of the brain (including presenile dementias, multiple sclerosis, and various unspecified degenerative diseases)

*Furthermore, the composition of the groups with respect to sex is not significantly different when the organic group is compared by *t* test to the functional group or when the convulsive group is compared to the functional group. The difference between the organic and convulsive groups is, however, significant at the 5 per cent level.

6 with hereditary degenerative diseases (Huntington's chorea)

The patients falling in the class of psychogenic disorders received a variety of discharge diagnoses which often specified a particular neurosis but at times reflected the somatic concomitants affecting other systems. Of the 49 patients comprising this group, only 3 were diagnosed as being psychotic, and these were probably in partial remission. Thus, the findings cannot be generalized to psychotic patients and should more appropriately be restricted to the less severe personality disorders.

The 35 patients in the convulsive group qualified for inclusion if their seizures, irrespective of whether they were petit mal, grand mal, or psychomotor in type, were of undetermined cause. This group, therefore, refers only to patients having idiopathic seizures.

RESULTS

Inspection of table 2 reveals that the patients in the organic group differed significantly from those in the functional group with respect to mean I. Q.'s obtained on the over-all Wechsler-Bellevue Scale, on the verbal scale, and on the performance scale. The differences in each case were in favor of the psycho-

TABLE 2. *Mean I. Q. and critical ratios for the groups on Wechsler-Bellevue Scales*

Groups	Full scale	Verbal scale	Performance scale
Organic	90.76	92.13	92.12
Convulsive	94.23	95.43	93.97
Psychogenic	110.82	108.31	111.82
Organic vs. psychogenic			
C. R.*	7.51	6.30	7.70
P**	<.01	<.01	<.01
Convulsive vs. psychogenic			
C. R.	5.17	4.25	2.75
P	<.01	<.01	<.01
Organic vs. convulsive			
C. R.	1.11	1.15	.55
P	I.***	I.	I.

*Critical ratio
**Probability
***Insignificant

genic population. The same level of significance applies to a comparison of the convulsive and psychogenic groups, the latter scoring higher on all three scales. However, there are no significant differences on any of the measures between the organic and convulsive groups.

Table 3 presents data on the per cent of cases in each of the experimental groups in which the verbal scale quotient differed or failed to differ from the performance scale quotient by at least 10 points. A chi-square test shows that the relative frequency with which the verbal I. Q. exceeded the performance I. Q. or the performance I. Q. exceeded the verbal I. Q. is not significantly different in these groups.

TABLE 3. *Relation between quotients on verbal and performance sections of the Wechsler-Bellevue Scale*

Groups	Verbal > Performance (per cent)	Performance > Verbal (per cent)	Verbal ≠ Performance (per cent)
Organic	27.5	28.6	43.9
Psychogenic	18.4	26.5	55.1
Convulsive	22.9	22.9	54.2

Hewson's method correctly identified 58.2 per cent of the patients with intracranial abnormalities. It falsely suggested an organic involvement in 12.2 per cent of the psychogenic patients but correctly detected 59.2 per cent of those with a functional disorder. Only 31.4 per cent of patients diagnosed as having a convulsive disorder of undetermined cause would be considered to have organic brain disease on the basis of Hewson's pattern of deviation ratios. Table 4 summarizes the results based on this method of analyzing Wechsler-Bellevue

TABLE 4. *Hewson's pattern of deviation ratios as applied to the groups*

Group	Suggestive of cerebral lesion	Suggestive of emotional disturbance	No evidence of either
Organic (N=91)	53	32	6
Psychogenic (N=49)	6	29	14
Convulsive (N=35)	11	23	1

subtest scores. A chi-square test indicates significance at better than the .001 level.*

Table 5 shows that the accuracy of prediction is enhanced when a total battery of psychologic tests is used. A chi-square analysis indicates significance at the .001 level.

TABLE 5. *Over-all impression based on psychologic testing*

Group	Impression			
	Organicity		No organicity	
	Number	Per cent	Number	Per cent
Organic (N=91)	60	65.9	31	34.1
Psychogenic (N=49)	2	4.1	47	95.9
Convulsive (N=35)	11	31.4	24	68.6

DISCUSSION

The observation that the organic group, as a whole, scored lower on the Wechsler-Bellevue Scale than did the other patients is in general agreement with Allen[3] and with Hunt and Cofer,[4] who found that organic brain disease tends to depress the I. Q. It is noteworthy that this lowering of I. Q. is reflected almost equally on performance and verbal tests. Contrary to the belief generally prevailing among clinicians, organic impairment does not seem to be more pronounced in the performance sphere. The assumption that emotionally disturbed patients do particularly poorly in the performance area seems likewise to be unwarranted. Irrespective of whether the mental disorder was caused by psychopathologic or organic brain disease, the majority of patients demonstrated a fairly small difference between verbal and performance section ratings. Even when this difference was large, it was probably of little diagnostic significance.

The finding that patients with demonstrable brain disease resemble more closely in intellectual functioning the patients who have seizures of undetermined cause than they do patients with psychogenic disorders is in disagreement with two studies cited by Klebanoff and associates.[5] In these studies a similar pattern was found for epileptics and neurotics which was strikingly different from that of patients with organic brain damage.

*This level of significance is maintained even when the last two Hewson categories are combined in order to eliminate an instance in which the expected frequency is less than 5.

In evaluating the Hewson method for detecting organic impairment, two major limitations inherent in the methodology employed in the present study should be mentioned. Both of these operated to reduce the apparent effectiveness of her technic. The first relates to the fact that the pattern of deviation ratios should more appropriately be tested only on patients having a cerebral abnormality. No claim was ever made by Hewson that the method could be applied to any type of intracranial lesion, as was done in the present study. Second, some of the cases doubtlessly represented a mixed picture in which there were significant emotional problems present in addition to an organic involvement. In these instances the emotional problems, if severe enough, may have masked the organic pattern. Thus it would seem that her method fared rather well considering these limitations imposed by the experimental design. Omitting the convulsive patients, the Hewson method correctly identified the organic or psychogenic condition in 59 per cent of the cases. The false positives, *i. e.*, the number of psychogenic cases erroneously classified as being suggestive of organic brain disease, was restricted to 12 per cent.

It comes as little surprise that a whole battery of tests is more useful in making these discriminations than is one single test. The psychologist often obtains important diagnostic clues from instruments such as the Rorschach or the projective drawings. With the assistance of the whole battery, correct identifications increased to 76 per cent, the false positives decreased to 4 per cent. In these computations the convulsive group, which presented a special problem, is omitted. It is interesting that in only about a third of the patients with idiopathic seizures were the test results suggestive of brain disease.

SUMMARY

The present study concerned itself with the performance of three groups of patients on the Wechsler-Bellevue Scale, Form 1. Not only were intellectual differences analyzed, but the efficacy for diagnosis of various commonly employed technics based on the Wechsler-Bellevue Scale was also investigated. The subjects in this study were a group of patients with psychogenic disorders, a group of patients having intracranial abnormalities, and a group of patients having seizures of undetermined cause. The results indicated that patients with organic brain disease score lower on all three Wechsler scales than do patients with psychogenic disturbances, and that convulsive patients tend to resemble the organic subjects more closely than they do functional patients. Differences between verbal and performance scale ratings do not seem to be related to diagnostic category. It was also demonstrated that the Hewson method is helpful for

diagnosis, but that the use of a whole battery of psychologic tests yields superior results.

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BABIES ARE NOT STUPID

I advise my young mothers to let the baby belch after feeding, change his diaper, and place him in bed wide awake. Some state that if the baby goes to sleep while feeding, she would not dare to awaken him, but would put him down and slip out of the room. This is courting trouble. Just as the baby that is rocked to sleep requires rocking when he wakes up, so the baby that is fed to sleep demands to be fed when he awakens. He is not hungry but wants to return to the satisfactory situation he was enjoying when he went to sleep. Personally, I think he would be a little stupid if he did not expect this and it is my opinion that the average baby is far from being stupid. In fact, if we could understand them as well as they understand us, our problems would be minimal.

—HUGHES KENNEDY, M. D.
in *Journal of Medical Association of State of Alabama*, p. 189, Feb. 1955

ROSENZWEIG PICTURE FRUSTRATION STUDY FOR SELECTING SAFE DRIVERS

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IN CONNECTION with the problem of highway safety, recent research has concerned itself with the task of attempting to measure, by psychometric methods, those personal factors that might distinguish between the safe and unsafe automobile driver. Studies have indicated that personality-type test items show considerable promise as predictors of ability to drive a motor vehicle safely.[1-3]

The Rosenzweig Picture Frustration Study (P-F Study), while still relatively new and untried, assumes to measure the modes of reaction to frustration that a person may adopt. The P-F Study consists of 24 picture situations involving two or more people. One person has made a statement, the other person is pictured with a blank balloon above his head. In some manner the other person is being threatened; *i. e.*, being accused of some act, being deprived of some wanted object, et cetera. The subject is required to write a reply in the blank balloon that he imagines the threatened person would make (fig. 1). In this manner, the subject's reaction to the situation is determined. The assumption is that reaction to these pseudosituations is a measure of how the subject might react in similar situations in real life. It is further assumed that the subject consciously or unconsciously identifies himself with the frustrated person in each pictured situation and projects his own bias in the replies given.

To determine this bias, scores are assigned each response as to direction of aggression and reaction type. Under direction of aggression are included (1) extrapunitiveness, in which aggression is turned onto the environment; (2) intropunitiveness, in which it is turned by the subject upon himself; and (3) impunitiveness, in which aggression is evaded in an attempt to gloss over the frustration. Under type of reaction fall (1) obstacle-dominance, in which the barrier occasioning the frustration stands out in the responses; (2) ego-defense, in which the ego of the subject predominates; and (3) need-persistence, in which the solution of the frustrating problem is emphasized.

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From the combination of these factors there results for each picture nine possible scoring factors and two special variants.

I'm very sorry we splashed your clothing just now though we tried hard to avoid the puddle.
1.
How awful! That was my mother's favorite vase you just broke.
2.
You can't see a thing.
3.
It's a shame my car had to break down and make you miss your train.
R.R.STA
4.

Figure 1. Representative page from the Rosenzweig Picture Frustration Study.

It is logical to hypothesize that an automobile driver's reactions to frustrating situations, especially on the highway, could be a prime factor in determining how safely he drives. Certainly a person who is willing to accept the give and take of highway travel will not tend to commit an unsafe act when confronted by such things as traffic jams and the annoying be-

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havior of certain fellow drivers. With this in mind, the P-F Study was submitted to two different groups of automobile drivers in an attempt to evaluate its ability to distinguish between the safe and the unsafe driver.

METHOD

Two groups were studied. One group consisted of those persons who had had at least one traffic accident within recent months during which they had also incurred a moving traffic violation. The other group consisted of persons who had never been involved in any kind of accident or incurred a traffic violation of any type.

The accident group was selected after an examination of Camp Lejeune accident records and was comprised of those persons who had been involved in an accident and had also been cited as being guilty of a moving violation. The nonaccident group was selected from those whose answers to a questionnaire indicated that they might be completely accident and violation free. Each of the group was further screened by interview technic.

From 446 subjects, 67 were found to be accident and violation free and to match a group of equal size from the accident-violation subjects. The basis for this selection and matching was: experience in years driving on state highways, estimated miles driven over the previous two years, age, marital status, parenthood, education in terms of highest grade completed, and number of years in service (table 1). The accident-violation record of the accident group is shown in table 2.

In addition to these factors, intelligence test scores as derived by General Classification Test (GCT) (civilian version) scores were equated on a group basis. The respective means were 108.7 and 109.2, with standard deviations (S. D.) of 17.6 and 14.8. The significance of difference between the means is represented by a critical ratio (c. r.) of 0.1947, which is not significant.

As part of a testing program each subject of both groups received the Rosenzweig Picture Frustration Study and a personal interview. The P-F Study was scored according to the method developed and outlined by Rosenzweig and associates.[4]

In addition to analyzing and comparing those scores routinely derived from the P-F Study, the results were subjected to an item analysis. This analysis allowed certain responses to specific test situations to be selected on the basis of whether or not they discriminated between the two groups.

RESULTS AND DISCUSSION

Of the various scores routinely produced by the P-F Study, only the Ego Defensive (E-D) and Need-Persistence (N-P) scales

TABLE 1. *Characteristics of accident and nonaccident groups*

Driving Experience in Years	A-V Free	A
0-2.9	6	6
3-5.9	17	18
6-7.9	22	22
8-9.9	11	11
10 and over	11	10
Age		
18-21	15	15
22-25	44	44
26-30	4	4
31-40	4	4
Marital Status		
Single	39	39
Married, no children	28	28
Married with children	11	11
Two-Year Mileage		
0-5,000	9	9
5,001-10,000	9	9
10,001-15,000	7	7
15,001-20,000	7	7
20,001-30,000	16	16
30,001-40,000	4	4
40,001-50,000	5	5
50,001-and over	10	10
Education		
Grades 4-8	12	14
Grades 9-12	47	47
Grades 13-16	8	6
Years in Service		
0-1.9	26	22
2-4.9	36	30
5 and over	11	15

showed significant differences at the 1 percent level of confidence. These results are outlined in table 3.

An item analysis of the 134 tests produced 10 significantly differentiating scores for 5 of the 24 test cartoons. These scores were all significantly different to about the 1 percent level of confidence (critical ratio as listed in table 4).

Each test was then rescored according to a method based on these 10 scores and the scores derived from the E-D and N-P percentages. The 10 items were simply arranged in order of the magnitude of the difference between the 2 groups, and the first 5 assigned a weight of 2 and the second 5 a weight of 1.

TABLE 2. *Accident-violation record of accident group (lifetime)*

Accidents (with and without violations*)	Violations* (without accidents)				
	0	1	2	3	6
1 (with)	9	18	2	1	1
2 (with)	3	5	-	1	-
2 (1 with; 1 without)	8	1	5	3	-
3 (1 with; 2 without)	3	1	-	-	-
3 (2 with; 1 without)	-	1	2	-	-
3 (with)	1	1	-	-	-
5 (3 with; 2 without)	-	1	-	-	-

*All violations listed are moving violations.

TABLE 3. *Parameters of the E-D and N-P scales that differentiate between accident and nonaccident groups*

Scale	Accident group		Nonaccident group		C. R.**
	Mean	S. D.*	Mean	S. D.	
E-D	53.3	10.170	59.3	11.153	3.229
N-P	30.7	09.450	24.9	10.320	3.368

*Standard deviation **Critical ratio

TABLE 4. *Rosenzweig item scores used to differentiate between accident and nonaccident groups*

Picture number	Score	Group with highest frequency	C. R.*	Weight
4	E-D	Nonaccident	2.9375	−2
13	m**	Accident	2.9017	+2
18	m	Accident	2.8385	+1
11	M***	Nonaccident	2.8024	−2
15	m	Accident	2.6933	+1
13	N-P	Accident	2.6841	+2
18	N-P	Accident	2.6632	+1
13	E-D	Nonaccident	2.6272	−2
4	m	Accident	2.5751	+1
4	N-P	Accident	2.4363	+1

*Critical ratio.
**Hope expressed that solution eventually will be found
***Blame for frustration evaded

Scores characteristic of the nonaccident group were assigned a negative weight; scores characteristic of the accident group were assigned a positive weight. For those scores derived from the E-D and N-P percents, weight was given according to the number of standard deviations any particular score fell toward or away from the mean of the other group. For example, with the N-P scores, all that fell within plus 1 S. D. of the nonaccident group mean and within minus 1 S. D. of the accident group mean were given a weight of 0, because these scores overlapped to too great an extent to be helpful in distinguishing between the groups. All scores falling between 1.0 and 1.5 S. D. below the nonaccident group mean were assigned a weight of minus 1; those falling between 1.5 and 2.0 S. D. below the mean were assigned a weight of minus 2; et cetera, until all scores encountered in the study were thereby assigned a weight. All scores that fell in similar fashion about the accident group mean were assigned the same weights with a plus sign (table 5).

TABLE 5. *Weight assigned E-D and N-P percentages used in differentiating between accident and nonaccident groups*

Ego-defensive		Need-persistence	
Percentage	Weight	Percentage	Weight
Under 37.0	+5	Under 11.8	−5
37.0 - 39.7	+4	11.8 - 14.2	−4
39.8 - 42.5	+3	14.3 - 16.5	−3
42.6 - 45.3	+2	16.6 - 18.9	−2
45.4 - 48.1	+1	19.0 - 21.3	−1
48.2 - 63.5	0	21.4 - 35.1	0
63.6 - 66.0	−1	35.2 - 37.8	+1
66.1 - 68.6	−2	37.9 - 40.4	+2
68.7 - 71.1	−3	40.5 - 43.0	+3
71.2 - 73.6	−4	43.1 - 45.5	+4
73.7 and over	−5	45.6 and over	+5

In order to eliminate the inconvenience of dealing with minus numbers, each of the resulting test scores was converted to a plus score by making a raw score of 0 equal to 20. A minus 5 then became 15, a plus 5 became 25, and so forth.

The test scores resulting from the combined procedure produced the parameters in table 6.

The biserial correlation yielded by these parameters is 0.53 ($\pm$ .06). Biserial correlations are not adaptable to prediction formulas and do not yield an error of estimate. However, it is possible to establish a cutoff score that will produce a maximum level of prediction for the scale. In this case a score of 21 or

lower was used for predicting inclusion in the nonaccident group. By using percent of total area under the normal curve between the mean ordinate and an ordinate at a given sigma distance, a success of prediction results, as seen in table 7.

TABLE 6. *Test scores after weighting as described in text*

	Nonaccident group	Accident group	Combined group
Mean	17.99	23.78	20.89
S. D.	6.19	6.33	6.88

TABLE 7. *Success of prediction using method described in text*

Cutoff score	Nonaccident group		Accident group		Percent total correct
	Percent correctly chosen	Percent incorrectly chosen	Percent correctly chosen	Percent incorrectly chosen	
21 - 22	68.79	31.21	61.03	38.97	64.91

These figures are not particularly impressive if one desires to use this scale as a sole means of selecting safe automobile drivers, but it might be of value as part of a test battery after being subjected to sufficient cross-validation. However, it is important to know that a test such as this can produce a correlation that is statistically significant and considerably higher than many that have been reported in the literature. It speaks well for the future development of technics like the Picture Frustration Study.

On the basis of these figures I have put together a collection of cartoons that deal entirely with highway situations. To date they have been used only clinically, with no attempt at systematic analysis.

SUMMARY AND CONCLUSIONS

Two groups of automobile drivers were given the Rosenzweig Picture Frustration Study in addition to other tests. These groups numbered 67 men each, and were equated according to age, marital status, parenthood, education, intelligence test score, years of driving experience, estimated mileage driven for the last 2 years, and time spent in service. Those in the first group were completely accident and violation free for their entire driving history, while those in the second were involved in at least one recent traffic accident in which they were charged with a moving violation.

The Rosenzweig Picture Frustration Study produced significant differences between the groups only on the basis of the Ego-Defensive and Need-Persistence percentages. In addition, item analysis of the test allowed 10 item scores to be used in differentiating between the groups. By weighting and combining the percentages and item scores it became possible to differentiate between the two groups. The biserial correlation obtained was 0.53 and the efficiency of prediction was 64.91 percent.

While this correlation does not allow the P-F Study to be used as a sole prediction instrument, it does indicate that test items such as those contained in this test have promise for future application to the problem of differentiating between the safe and unsafe automobile driver.

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THE ART OF SELF-EXPRESSION

The lack of competence of most physicians as speakers is not surprising. After all, they spend their time doctoring and not orating. Medical teachers need not be orators but they can avail themselves of some of the modern visual aids in teaching and learn some of the rudiments of clear presentation. Too often slides used are so complicated that they merely confuse. Medical movies, colored slides and so forth have great value as adjuncts in teaching. Much assistance in the planning and execution of teaching exercises can be given by a professional organization.

—LAURENCE B. ELLIS, M. D.
in *New England Journal of Medicine*
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ENURESIS: CLINICAL, LABORATORY, AND ELECTROENCEPHALOGRAPHIC STUDIES

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FROM the most remote times of antiquity, in such diverse civilizations as the Mesopotamian, Hindu, and Greek, physicians have treated disorders of the genitourinary tract.[1-3] However, enuresis is one disorder which has baffled medical science for centuries. In his *Natural History,* the Roman Pliny prescribes a course of therapy to eradicate enuresis that includes such measures as the consumption of wood lice and spayed swine's urine.[4] This is similar to some more present-day treatments in which the unfortunate suffering from enuresis is served fried rats or mouse pie in an effort to effect a cure.[1,5] Goldman,[6] in a review of the medical history of enuresis, lists an astonishing number of desperate and drastic treatments extant in the 18th, 19th, and 20th centuries that frequently are without any apparent rationale.

To the United States Navy, the effects of enuresis are tremendous in scope since they include inestimable economic and morale problems. The enuretic is deemed unsatisfactory for sea duty because the confined quarters and lack of ventilation compounds the unsavory ammoniacal odor. The enuretic seaman is subjected to teasing, derision, jibes, and taunts. He may make a valiant effort to break his habit by reducing his water intake and making frequent visits during the night to the "head." As the difficulty persists, however, the man becomes subjected to more intense tirades and even minor aggressions by his shipmates. Furthermore, the sleeping accommodations on board many ships are such that the enuretic's habit would be tangibly objectionable to any man who might happen to occupy a bunk beneath him. The enuretic may become the indirect cause for an impairment in the efficiency of the crew.

These inconveniences to the individual and the group are even more striking when viewed during the process of "boot training." For all men this is, at best, a period of turmoil, but for the enuretic it is a period that presents near-insurmountable adjustment

From U. S. Naval Training Center, Great Lakes, Ill.

problems. The competitive, masculine standards of military life will not allow such a blatantly overt manifestation of what is generally considered to be "immaturity." As the enuretic is often responsible for the accumulation of demerits for the entire company, he is liable to become the target for all manner of group dissatisfactions, which are many during the rigorous process of attempting to convert a civilian boy into a military man in a relatively short period. Also, the harassed company commander finds the habit of enuresis particularly offensive, since it reflects on the ideals which he is trying to inculcate in his group. The warrior, sterotypically, is not a bed wetter. Therefore, despite whatever progress in training a man might make, if he is enuretic he has to contend with negative feelings from many sources. Not infrequently, this cumulative stress so taxes his capacity to adjust that all areas of his naval life are adversely affected and he has more difficulty with enuresis. This vicious cycle is so extreme that even a man with many successful ego strengths would be pressed to remain emotionally stable. It must be fully appreciated that the deleterious influence of this vicious cycle on one man so affects his interpersonal relationships that serious disruption of the group results, and consequently its over-all training suffers. For these reasons the enuretic recruit is discharged from the Navy.

Although it is realized that to go home after being in the Navy for only a few weeks may cause serious emotional traumata, such as feelings of self-devaluation and inadequacy, to the youth as he re-integrates into his home community, these matters are beyond the control of the Navy. The youth must handle for himself his own attitudes as well as those arising from injured family pride or from a condescending, patronizing, or hostile community.

PURPOSE

Between 25 February 1954 and 25 February 1955, nearly one out of every 100 men entering naval service at this naval training center was discharged prior to completion of boot camp because of enuresis.[7] This represents a drain on available manpower, a considerable economic expenditure in transporting and training men who will never contribute to the Navy, and a variety of morale problems. Accordingly, it was considered that the study of enuresis was necessary from a practical viewpoint. Since there is a super-abundance of clinical case material in the military which would not be available to civilian investigators, it was believed also that perhaps some contribution to the further understanding of enuresis might result. Therefore these studies* were made: (1) to determine which, if any, enuretic recruits might be

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rehabilitated for service in the Navy, and (2) to discover any objective methods which would aid in the quicker detection of those incapable of being rehabilitated.

In regard to rehabilitation, it is hypothesized that some enuretics might possess enough assets to warrant their retention, even if only in some limited capacity such as permanent shore duty, where they could make definite contributions to the service. In times of complete mobilization, the loss of all enuretics could represent a needless diminution of naval strength. On the other hand, it is important to detect as soon as possible, whether in war or peacetime, those enuretics who are unable to make positive contributions and who are carried along until separated as economic and psychiatric liabilities.

In the first investigation biologic, social, and psychologic factors were surveyed in a comprehensive manner in the hope that further paths of fruitful study would be indicated. Ultimately, we hope to establish a treatment colony that will test the efficacy of various modes of therapy aimed at facilitating the rehabilitation of enuretics. This report is concerned with the findings of clinical, laboratory, and electroencephalographic examination. Future reports of the primary research project will deal separately with psycho-social factors and other research approaches.

DEFINITION

For the purposes of our investigation we shall use Wilson's[8] definition of enuresis: "Enuresis, then, can be defined as bed- or clothes-wetting (in those) above the age of 3, who fail to inhibit the reflex when the impluse is felt during waking hours, or do not rouse from sleep of their own accord when the process is imminent."

MATERIAL

In this primary study we contrasted 60 enuretic recruits with 60 men in Electronics School. Considerable effort was made to be certain that all enuretics actually suffered persistently from this difficulty. Not only did we have observations by company commanders and trained hospital corpsmen, but in each instance, upon the man's admission to the neuropsychiatric unit, a telegram was sent to a social service agency in his home area requesting them to procure information from his family in regard to enuresis. This use of telegraphic confirmation of enuresis was not known generally, so it is unlikely that recruits had any chance to solicit the aid of their loved ones in perpetrating fraud. In addition, there was other evidence besides the admitted history of enuresis, observations by competent persons, and telegraphic confirmation. This evidence included documents filled out by the recruit when he entered the Navy in regard to his past history

of enuresis. At this time, most youths are too motivated for service and too unsophisticated in military ways to plan for an early discharge by falsifying this record. Several recruits were sent for medical evaluation upon discovery of tell-tale mattress rings during inspection by the company commander. We believe that these measures were successful in deleting from the study those youths who purposely wet the bed in an effort to escape from service. The fact that many resort to purposeful bedwetting is a well-known fact to all military and medical officers and has been commented upon frequently in the medical literature. Parenthetically, it might be added that approximately 40 per cent of the telegrams sent out failed to confirm the alleged history of enuresis.

It is regrettable that military circumstances precluded the procurement of a random recruit control group more closely matched to the experimental group. The control group was made up of men who had finished an initial course in mathematics and were ready to enter basic electronics. As will be seen, this control group represented slightly different ranges in age and length of service. A more radical difference can be observed when the geographic and racial distributions of the groups are contrasted. Also, the I Q's of the control group used differed more markedly from those of the experimental than would those of a random group. However deplorable this situation might be from a scientific viewpoint, the groups used do consist of individuals regarded as unsuitable for service and those regarded as highly suitable. The Electronic School represents one of the most coveted service school assignments, and the caliber of its candidates is the highest, generally, that can be found among enlisted men.

METHOD

A three-part procedure was used in this investigation. On both experimental and control groups the following studies were carried out: (1) electroencephalographic examination, (2) administration of a battery of psychologic tests, and (3) psychiatric interviewing. This article will discuss only the electroencephalograms and the clinical and laboratory findings.

The electroencephalographic tracings were all made on an Offner type ink-writing oscillograph with the technic of 12 lead monopolar and bipolar recordings, bilaterally, from the frontal, parietal, and occipital areas. All the recordings were made within a period of three hours after eating.

It may be assumed fairly that all men in the study were in "normal health," since they had all undergone recent, thorough physical examinations. The population we were dealing with and the fact that its members were able to participate actively in

military service is functional evidence of good health. To control the study, however, diligent inquiry into the past history of sickness, injury, and circumstances of birth of all the men was made. Particular emphasis was placed on any periods of unconsciousness and on positive findings in the review of the genitourinary system. Any family history of enuresis or of convulsive disorders was also carefully sought. The findings elicited from this inquiry are summarized in table 1. Neurologic examination was performed on each man. On approximately one third of the men from each group, voided specimens of urine were obtained at random and studied.

TABLE 1. *Findings in medical histories of 60 enuretic and 60 normal subjects*

Findings	Enuretics		Controls	
	No.	%	No.	%
Past history of enuresis	60	100.0	14	23.3
Family history of enuresis	45	75.0	10	16.7
Somnambulism	16	26.6	2	3.3
Unconsciousness				
Fainting	15	25.0	8	13.3
Other causes	10	16.7	20	33.3
Delirium during febrile illness	2	3.3	2	3.3
Epilepsy				
Suspected	7	11.7	0	
Treated for	3	5.0	0	
Anosmia	1	1.7	1	1.7

RESULTS

No significant abnormalities were found by physical or neurologic examination in any person included in this report. Three enuretics and one of the controls showed absence of a cremasteric reflex; these men had been subjected to herniorrhaphy. One enuretic and one control claimed to have anosmia and were discovered by routine tests (tobacco, cinnamon, nail polish) to have some gross impairment in olfactory sensation. The enuretic was suspected of malingering, and the control dates his anosmia from a rhinoplasty. One enuretic and one control were judged to have nystagmoid motion on lateral gaze, and in each case it was presumed to be congenital. One control showed some sequelae from a severed left ulnar nerve. Another control persistently demonstrated marked increased muscle strength throughout the right side of his body. All these men had negative electroencephalograms and negative urinary findings by history and by urinalysis, if performed.

Two enuretics, however, were noted to have divergent strabismus. One had an abnormal brain wave and complaints of frequency and urgency; the other had a negative brain wave and negative urinary findings.

Only 1 (1.7 per cent) of the controls showed a borderline electroencephalogram; 59 readings were interpreted as normal. Fifteen (25 per cent) of the enuretics, however, had other than normal electroencephalograms. Of these, two were read as borderline, while 13 were abnormal; all were characterized generally by a poorly regulated and poorly developed alpha rhythm of about 8 to 10 per second. The location of the abnormality was always in the anterior and posterior portions of the head, and the speed, typically, had slow activity of about 5 per second. Upon hyperventilation, there was consistent building up of the amplitude and a slowing of waves to about 4 per second. The single borderline control record demonstrated 10 per second alpha rhythm in the anterior and posterior portions of the head, with slow activity (5 to 6 per second) of mildly increased amplitude. It was of interest that the control showing a borderline electroencephalogram had been enuretic until the age of 15 and had immediate family members who wet their beds.

A review of the genitourinary system of 60 controls revealed four isolated complaints. None of these complaints were of present interest to the subject. The enuretics, however, registered 76 complaints, nearly all of which were of current and life-long concern to the subjects. The control subject with the borderline electroencephalogram had no complaints. The type and frequency of these complaints in both groups are outlined in table 2.

Urinalyses were done on 26 men in the experimental group and on 20 men in the control group. The research design calls for more careful attention to qualitative and quantitative urine observations in the future; these specimens were done merely to see if any detectable trends were apparent. In addition to the findings in table 3, the enuretics' urine showed three times as many cellular casts (27:8).

Table 4 summarizes the statistical treatment of the electroencephalographic relationships.

Each of three enuretics was a member of a set of twins. None of the controls had co-twins. Two enuretics were fraternal twins. Both of these men had negative brain waves, but one had an enuretic co-twin. The third enuretic, who had an identical twin (who was not enuretic), had an abnormal brain wave.

Two enuretics had been delivered at birth by cesarean section. Like the one control who had been delivered in this manner, they had normal brain waves. One enuretic had been delivered by

TABLE 2. *Type and frequency of genitourinary complaints occurring in enuretic and control groups*

Complaints	Times occurring in		
	Enuretic group		Control group (60)
	Normal EEG (45)	Abnormal EEG (15)	
Urgency	20	5	1
Difficulty initiating stream	3	3	1
Burning	9	2	1
Frequency	11	3	1
Dysuria	5	2	0
Purulent or smoky urine	3	1	0
Nocturnal dribbling	1	0	0
Costo-vertebral angle tenderness	5	0	0
History of glomerulonephritis	2	1	0

TABLE 3. *Findings of urinalyses in 26 enuretic and 20 normal subjects*

Findings	Times occurring in			
	Enuretic group		Control group	
	No.	%	No.	%
Acid	21	80.8	13	65.0
Proteinuria	3	11.5	0	0.0
Albumin (trace)	0	0.0	1	5.0
Specific gravity				
Under 1.015	3	11.5	1	5.0
Over 1.022	2	7.7	11	55.0

breech and he, too, had a normal brain wave. One enuretic stated that both he and his mother were uremic at the time of his birth. He had an abnormal brain wave and was ostensibly "organic" on direct examination of the mental status. A random blood urea nitrogen determination on this man was 20 mg per 100 ml, and he complained of urgency and difficulty in initiating micturition.

TABLE 4. *Significance of findings in enuretic and control groups*

Findings	Observed frequency		χ^2*	P**	Interpretation
	Enuretics	Controls			
Abnormal EEG's	15	1	10.56	0.01	+++
Family history of enuresis	45	10	21.02	0.01	+++
Abnormal EEG's and positive family history	9	1	4.90	0.05	++
Genitourinary symptoms	38	3	35.02	0.01	+++
Genitourinary symptoms and abnormal EEG's	8	0	6.12	0.02	++
Genitourinary symptoms, abnormal EEG's, and family history	5	0	3.20	0.05	+
History of sleepwalking	16	2	9.40	0.01	+++

*Chi-square
**Probability
+Borderline significance
++Significant
+++Highly significant

Most of the controls having a history of unconsciousness from causes other than fainting had been knocked out while engaged in sports. None of them seemed to have suffered epileptic seizures. Five of the enuretics who had lost consciousness from causes other than fainting seemed to have had seizures of some sort.

DISCUSSION

An integrated commentary at this juncture in our studies is not possible, Also, many of the most enlightening observations made during this experiment are based on the psychologic and psychiatric data. Much of what has been indicated by this particular phase of the study will be thoroughly discussed in our report concerning research suggestions.

Readers outside the field of neuropsychiatry may not be fully aware of the implications of anosmia. Anosmia often is the only symptom of olfactory meningioma. This tumor has been called the most important in psychiatry since its mental manifestations are protean and it is frequently remediable by operation.[9,10] In a study of electroencephalograms, accordingly, one must be alert to this diagnosis in the evaluation of data. By means of thorough roentgenographic and clinical examinations we believe we excluded the possibility of this tumor in this series of cases.

Another point to consider is the medical histories of subjects undergoing electroencephalographic examination. Of the 10 enuret-

ics suspected of or treated for epilepsy (table 1), five had family members definitely diagnosed as epileptic. Seven of the 10 had abnormal brain waves. In the controls there were no personal histories suggestive of epilepsy and only one situation of a family member being treated for epilepsy. The contrast in these groups forces one to recall the oft-quoted dictum of Freud that nocturnal enuresis, unless epileptic, must be considered a "pollution."[11]

Eminent medical scholars have wondered if the electroencephalographic pattern could be an hereditary trait and an indirect index of cortical metabolism,[12,13] while other investigators have satisfied themselves as to the existence of central nervous system pathways and nuclei which regulate micturition.[14-16] The integrity of these multiple centers is regarded as essential for normal micturition. Regulatory controls for the voluntary detrusor vesicae and external and internal sphincters, as well as for subcortical centers, sensory centers, and nuclei for correlation, have been described. These centers are variously located in the precentral gyrus (detrusor vesicae and external sphincter), paracentral lobule and outer sigmoid gyrus (internal sphincter), cerebral peduncle, thalamus, and corpus striatum (subcortical centers), frontal lobe, cerebellum, and corpus striatum (nuclei for correlation), and midbrain and gyrus fornicatus (sensory centers).

The significant preponderance of abnormal brain waves in the chronic adolescent male enuretics whom we have studied strongly suggests that an organic factor must be considered in determining the causes of enuresis. Further evidence of this factor is adduced from the fact that 75 per cent of enuretics had a family history of enuresis.

Confirmation of findings by other workers in regard to the presence of abnormal brain waves in enuretics is made by our investigation. Turton and Spear[17] reviewed the literature on this subject and presented their findings of 51 abnormal electroencephalograms from a study of 100 severely enuretic children. They, too, concluded that in many cases of enuresis there must be a physical basis for the symptom. There are other organic factors assumed to be causes of enuresis, such as urethral strictures and congenital defects, that are beyond the scope of this article because they do not specifically involve electroencephalograms.

After studying the pedigrees of 59 clans, Frary[18] in a classic work hypothesized that enuresis is determined by a single recessive gene substitute. Most workers in the field have decided that there apparently is a familial aspect to enuresis, although many attribute this to sociocultural influences, while many others merely note the relationship. We found exactly the same percentage of positive family histories that Levine[5] noted in his study of 150 enuretic sailors during World War II.

The abnormal electroencephalogram and a family history of enuresis indicate a factor of organicity, although the causes of enuresis seem to be numerous. We would like to suggest a third possibility which should be further developed. Recently, a resourceful investigation has shown, by means of electroencephalograms and electromyograms, that the enuretic is physiologically awake at the time of wetting.[19] We shall not enter at this time into the controversy as to whether or not the enuretic is a "heavy sleeper." However, sleep disturbances may be characteristic of the enuretic and may be a direct and measurable result of an inherited gene pattern. The distorted gene pattern might cause abnormal brain waves, as well as sleep disturbances such as night terrors and somniloquence, which have been known for many years to occur in enuretics.[20]

There has been little commentary in the literature concerning the occurrence of sleepwalking in enuretics. Berdie and Wallen[21] found that their enuretic marines were more likely to sleepwalk than a matched control group, but they did not give numerical information. Unpublished data that we are now collecting would indicate that adolescent male sleepwalkers commonly have a problem of enuresis. In our study it was found that a significantly large number of enuretics were sleepwalkers.

Perhaps a neurophysiologic explanation for some cases of enuresis will result from increasing knowledge of those factors in the reticular brain stem formation which manage the state of wakefulness.[22,23] Theoretically, genetically determined, anatomic impairment might explain in some cases the occurrence of enuresis and the clinical observations of abnormal brain waves, the high correlation of positive family histories of enuresis, and the proclivity to sleep disturbances.

Evaluation of the urinary findings is difficult. Creevy[15] discusses the effect on micturition of lesions in the nervous system. He quotes also from the literature concerning the effects of brain lesions on bladder disturbance. The methodologic troubles secondary to producing specific lesions in mixed motor-sensory nerves makes judgment of experimental results difficult. Nevertheless, one is reminded of the enuretic's complaints of frequency, dysuria, and urgency when he considers that these complaints are sequelae to sensory or motor irritation in the nervous system. Of course, it is very likely that the enuretic dwells more consciously on the malfunctioning of his renal system, for an organic lesion would provide a socially acceptable explanation for his "weak kidneys." In talking to hundreds of enuretics, however, we have gained the opinion that in many cases much of the preoccupation with genitourinary problems has an authentic organic basis. We must defer at this time a consideration of how this may relate to brain waves or to urinalysis findings.

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SUMMARY

The importance of enuresis as a military problem is discussed. A survey of possible organic, psychic, and social factors in etiology was undertaken in an effort to determine which enuretics could be salvaged for the Navy and what treatment methods might be used for this purpose.

Study of 60 enuretic recruits and 60 nonenuretic Electronic School students reveals that more enuretics have abnormal brain waves (25 per cent to 1.7 per cent), more enuretics have relatives who are enuretic (75 per cent to 16.7 per cent), enuretics have more problems with sleepwalking (26.6 per cent to 3.3 per cent), more genitourinary complaints (76:4), and there is evidence suggesting that enuretics' urine is qualitatively different.

It is postulated that in the chronic adolescent male enuretic, a factor of organicity must be reckoned with in the consideration of causes, although there must also be multiple factors of a "functional" nature.

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WHAT CHILDREN INHERIT

Children acquire the quality of dominance or submission characteristic of the parent of the same sex and the quality of hypoordinacy or hyperordinacy characteristic of the parent of the opposite sex, if they have no older siblings of their own sex. Succeeding children are usually opposite in temperament from the preceding sibling of the same sex if this preceding sibling is not more than a few years older.

—FRANK R. BARTA, M. D.
in *Nebraska State Medical Journal*
p. 501, Dec. 1954

BEHAVIOR

"Biology supplies an arm and fingers, a skeleton and muscles, and a reflex and 'voluntary' control of movement; but it cannot yet account for the individual characteristics of each person's handwriting. Biology can pretty well characterize the violin but is only on the edge of understanding why one plays sweetly, another not. The biologist is happy to recognize that two men or two violins are more like each other than like anything else in the world; psychiatric practice takes the violin for granted and is concerned with the sour notes that come from certain ones. Biological science seems to deal with the Cheshire cat; mental science, with its smile."

—R. W. GERARD, M. D.
in *American Journal of Psychiatry*
p. 81, Aug. 1955

THE NEW RAPID TEST FOR BILIRUBINURIA

Its Usefulness In Hepatitis

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With the Technical Assistance of
A. E. Lister, *Sergeant, first class, Medical Service, USA*

OBJECTIVELY, acute hepatitis is characterized, in successive phases, by bilirubinuria, increased urinary urobilinogen, elevated concentration of serum bilirubin, aberrations in the several flocculation tests, and abnormal retention of injected sulfobromophthalein. In the absence of a specific test for viral hepatitis, these determinations are of value not only in the diagnosis of the disease but also in following its course. Of the parameters listed, bilirubinuria usually is the first which may be detected and one of the most consistent through the course of acute hepatitis.

Recently, there has been made available a simple, rapid test for the detection of bilirubinuria, based upon the property of bilirubin to couple with diazo compounds to produce a characteristic color reaction.[1,2] The active reagent (*p*-nitrobenzene diazonium *p*-toluene sulfonate) is incorporated in a stable tablet* which is used in a manner similar to the well-known tablet tests for sugar, acetone, and blood. The test requires only the tablet, a suitable mat (supplied with the commercial package containing the tablets), and water; the result is available in 30 seconds.

The purpose of this study was to correlate the presence of bilirubinuria with the concentration of serum bilirubin and the clinical course of hepatitis as observed in hospitalized patients.

MATERIAL AND METHODS

Clinical and laboratory observations were made on 50 unselected patients of the gastroenterology service in this hospital

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*Manufactured under the proprietary name "Ictotest" by the Ames Company, Inc., Elkhart, Ind. The item is available from the Armed Services Medical Stock List (Stock No. 6505-290-6031, Bilirubin Test Kit, 90 diazonium tablets and 90 absorption mats).

because of liver disease during the year prior to 1 May 1955. The series included 40 patients with acute viral hepatitis, presumably of the IH type; the remainder had protracted hepatocellular disease, *e. g.*, Laennec's cirrhosis, fatty metamorphosis of the liver, and chronic hepatitis. Serial determinations of serum bilirubin, thymol turbidity, cephalin-cholesterol flocculation, sulfobromophthalein retention (in the absence of jaundice), and the urinary concentrations of bilirubin and urobilinogen were recorded at intervals of one week or less. The tablet test for bilirubinuria was performed according to the method described in detail by Giordano and Winstead.[2] Almost 1,000 tests for bile in the urine were performed by this method in the course of this study.

RESULTS

Bilirubinuria was detected in all cases of acute hepatitis during the icteric phase of the disease. Of 169 simultaneous determinations of bilirubin in both the serum and urine, 8.3 per cent of the reactions were recorded as negative for bilirubinuria in the presence of elevated serum bilirubin concentrations. In 14.2 per cent of the determinations, a positive reaction for bile in the urine was obtained when the serum bilirubin concentration totaled less than 1.2 mg per 100 ml; however, in only two of these patients was the "direct-reacting" fraction less than 0.2 mg per 100 ml. A general, although inconsistent, correlation was observed between the concentrations of serum bilirubin and the quantitative estimation of bile in the urine (fig. 1).

Without exception, the tablet test for bilirubinuria was positive in patients with acute hepatitis at the time of the patient's admission to the hospital. In almost all patients bilirubinuria was consistently present through the overtly icteric phase of the disease even though the patient's urine had resumed a normal color to casual inspection. In the group of patients with acute hepatitis admitted directly from the unit dispensaries, an elevated serum bilirubin persisted for an average of 27.2 days. In about two thirds of the patients, bilirubinuria disappeared shortly prior to the return of serum bilirubin to normal. The course of the disease, as observed in this group, was comparable with that succinctly depicted in the official monograph dealing with infectious hepatitis.[3]

Comment. The rapid tablet test has been established as a sensitive and reasonably reliable detector of bilirubin in the urine, and it has been demonstrated to compare favorably with the more cumbersome, orthodox Watson-Hawkinson and Harrison tests.[1,2] In our experience, we have found the test easy to set up and to read, and remarkably adaptable to the patient's bedside, the physician's office, the dispensary, and the field. The

sensitivity of the reagent is attested by the observation that a positive color reaction is obtained within 30 seconds on the addition of urine containing as little as 0.05 mg of bilirubin.[2] At the same time, caution must be exercised to avoid misreading as "positive" a faint pink blush which may appear at the base of the tablet with addition of water or a color reaction which appears *after* 30 seconds.

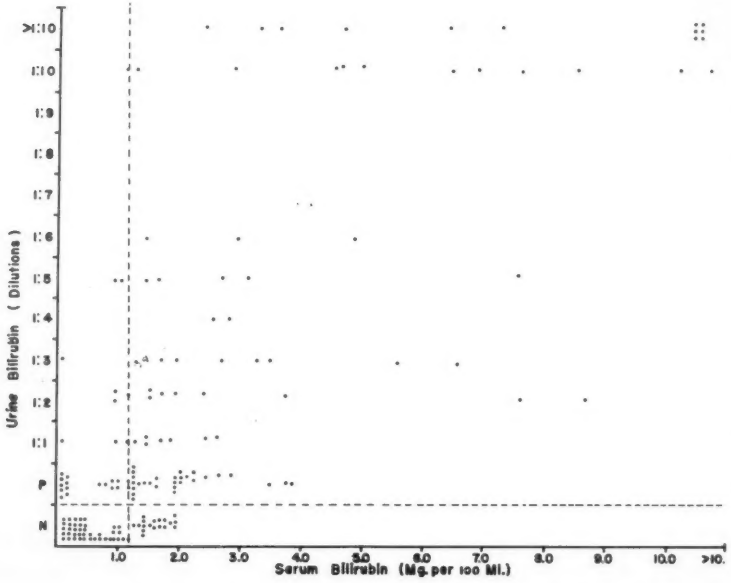

Figure 1. Scattergram depicting the correlation in 169 simultaneous determinations of bilirubin in serum and urine taken from patients with active hepatocellular disease. At the ordinate, P *denotes positive and* N *denotes negative; to the left and below the broken lines lie normal values.*

DISCUSSION

Usefulness of the Test in Diagnosis. By analysis of our cases of acute viral hepatitis observed within the past year, we have found the first symptoms of the disease develop on an average of 7.5 days prior to the patient's admission to the hospital. Invariably these symptoms were protean with rarely a suggestion that frank hepatitis was to ensue within little more than a week. It was during this prodrome that the soldier usually presented himself for the first time to the unit dispensary. It is little wonder that in almost every case, in the absence of more definitive signs, he was returned to duty and received only symptomatic treatment.

It is noteworthy that we found "dark urine" to have been observed by the patient on an average of 5.5 days prior to admission. In almost all cases this was the first definitive sign of liver disease. Curiously, the patient seldom related this observation voluntarily, and only by direct questioning could this sign be elicited. In only two patients was the appearance of "dark urine" delayed until the onset of overt jaundice; in the remainder, "dark urine" preceded awareness of jaundice by an average of 3.9 days. Jaundice was detected, either by the patient, his buddies, or the physician, only 1.7 days, on the average, prior to hospitalization.

From the analysis (fig. 2) it is obvious that the best opportunity by which to establish a presumptive diagnosis of hepatitis

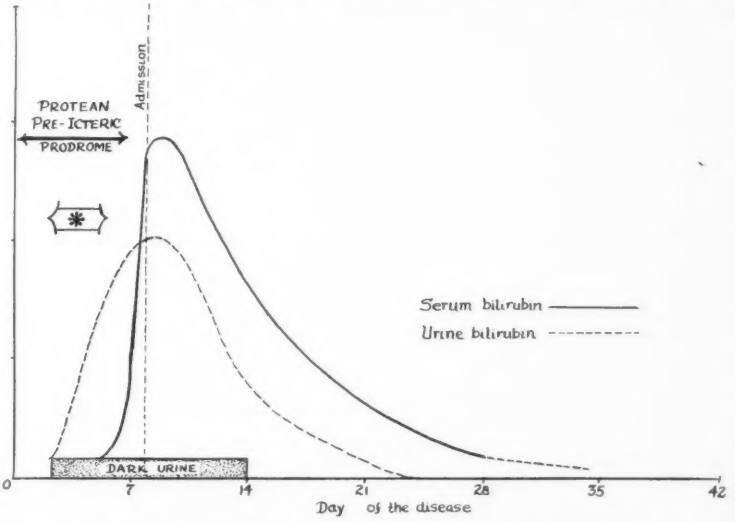

Figure 2. Diagram illustrating the course of acute viral hepatitis as observed in the group of patients described in this study. Particular reference is made to the sequence of bilirubinuria and hyperbilirubinemia. The asterisk denotes the important interval during which bilirubinuria may be the sole definitive sign of the disease in the preicteric phase.

in the preicteric phase lieś in the four days during which bilirubinuria is the sole and only easily detected, definitive sign of the disease. How often is the medical officer in a quandary regarding the possible existence of acute hepatitis in the soldier complaining of nondescript malaise, anorexia, nausea, and vomiting? Given this meager information alone it is exceedingly difficult to assign an accurate diagnosis. In such a case, however, when one can determine objectively the presence of bile in the urine, the diagnostic problem may be resolved. The prompt

detection of hepatitis will result in earlier hospitalization and the institution of appropriate supportive treatment, which can favorably affect the subsequent course of the disease. Further, such early detection more quickly withdraws the soldier who harbors the virus from his unit organization and could be expected to diminish the likelihood of contagion.

Usefulness of the Test in Following the Disease. In observing the course of acute viral hepatitis, a series of sequential "milestones" is customarily noted. With the advent of frank jaundice usually the subjective discomfort of the patient remarkably subsides. Nausea is abated, appetite returns, the notorious distaste for tobacco disappears, and the distress in the right upper abdominal quadrant, if present, diminishes. In our group of patients, with only two exceptions, the peak concentration of serum bilirubin was recorded at admission, and almost invariably the jaundice gradually diminished following institution of the "liver rest and support regimen." In sequence, the next observation is usually an apparent return to normal in the color of the urine. However, in our series, "occult bile" by chemical test remained even though the urine appeared to be of normal color. Grossly apparent jaundice then disappeared although the serum bilirubin concentrations slightly exceeded normal values. Bilirubinuria cleared in an average of four days before the serum bilirubin reached normal levels in both the "direct" and "indirect" fractions. For an unexplained reason, in about one third of our patients, bilirubinuria persisted beyond the return of serum bilirubin to normal. Perhaps this reflects an altered renal threshold for bilirubin.[3] Finally, the sulfobromophthalein retention test, that we use after overt jaundice has disappeared, remains elevated usually one or two weeks.

Usually when the findings of the serum bilirubin concentration test approach the normal, we permit the patient to begin progressive ambulation. When the sulfobromophthalein test returns to normal, the patient is usually released from the hospital. We find we are neither justified nor required to insist upon normalcy in the flocculation tests before returning the patient to duty. Often there is an inordinately protracted period during which these tests may remain "positive" and yet during which there is no other sign of activity of the disease.

With this sequence of events, we have found the rapid test for bilirubinuria to furnish us with a signal, in the absence of overt jaundice, that the serum bilirubin may be expected to reach a normal concentration within a short interval. This may permit slightly earlier ambulation and subsequent rehabilitation in a majority of patients.

SUMMARY AND CONCLUSIONS

Experience with a new, rapid test for bilirubinuria (ictotest) is described in a relatively large group of patients with acute viral hepatitis. We have found the test simple, sensitive, and reliable. There is a reasonably good correlation between bilirubinuria as detected by this test and relative concentrations of serum bilirubin.

The test should be of primary value in the early detection of acute viral hepatitis prior to the frankly icteric phase, thus facilitating earlier hospitalization and treatment. It is helpful in following the course of the disease and often heralds the return of normal serum bilirubin concentration. This may serve as a criterion for beginning progressive rehabilitation of the patient.

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A PHYSICIAN'S TRUE WORTH

The great strides in medical knowledge have come through the voluntary efforts of the individual. Once an idea has been shown to have merit, its sponsor has generally won the material support necessary to develop the idea. Remember, pain is not deterred by race, creed, wealth, or poverty. Medicine and surgery know and are restrained by no boundaries. A physician's true worth lies in his knowledge and understanding of things of the past and those of today, combined with his ability to anticipate tomorrow's need and apply the sum total in the care of and for the welfare of the patient at hand.

—WILLIAM A. HUDSON, M. D.
in *Diseases of the Chest*
p. 72, Dec. 1954

ARTHRO-ONYCHODYSPLASIA

A Hereditary Syndrome

HAROLD BRODER, *Captain, USAF (MC)*

A **HEREDITARY** syndrome consisting of an unusual combination of skeletal disorders forms the basis for this report. Bilateral posterior dislocation of the radial head, hypoplasia and lateral dislocation of the patellas, dystrophy of the nails, and a horizontal sacrum were discovered during the examination of a young airman. Similar abnormalities existed in an older brother and had been present for three known generations of the same family.

CASE REPORTS

Case 1. A 17-year-old man sought advice at this hospital because of pain and swelling in the knees after marching and prolonged standing. These symptoms had been noted following excessive activity for many years. Physical and roentgenographic examination revealed the following: (a) *Knees*—knobby in appearance (fig. 1); very small patellas articulating with lateral aspect of lateral femoral condyle; shallow articular groove on lateral femoral condyle for patella (fig. 2); downward and oblique lateral pull of quadriceps tendon; shallow, empty, palpable intercondylar notch of the femur; prominent medial femoral condyle; prominent tibial tubercle with lateral displacement; active motion, 160° to 45°; passive motion, 185° to 45°; no ligamentous instability. (b) *Elbows*—radial head prominent posteriorly at level of upper end of olecranon; atrophy of capitellum (fig. 3); limitation of terminal 15° of extension, pronation, and supination. (c) *Nails*—absence of both thumb nails; grayish discoloration and longitudinal ridging of other nails of hands and feet. (d) *Back*—severe lumbar lordosis; horizontal sacrum (fig. 4). (e) *Legs and feet*—external rotation deformity of leg, 45°; secondary varus of feet (in order to point the feet forward in walking).

Case 2. The patient's 21-year-old brother had similar defects of the right elbow, knees, nails, and spine. The complaints again were limited to the knees (fig. 5).

The maternal grandfather and mother were both affected as were our patients. They were dead, however, and their histories could not be confirmed by examination. No information was available concerning the grandfather's forebears. An older brother and

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a younger sister of the mother were unaffected. An older sister and younger brother of the third generation were entirely normal.

Figure 1 (case 1). Patient with arthro-onychodysplasia. Note knobby appearance of knees, external rotation of legs, posterior prominence of radial heads.

DISCUSSION

While isolated hereditary posterior displacement of the radial head, patellar dysplasia with or without dislocation,[1-3] dystrophy of the nails[4-6] and horizontal sacrum are not uncommon, their combined appearance as a familial disorder is exceedingly rare. A hereditary triad characterized by posterior dislocation of the radial head, hypoplasia with lateral dislocation or absence of the patella, and dystrophy of the nails has been described by Aschner,[7] Bates,[8] Lester,[9] Montant and Eggerman,[10] Senturia and Senturia,[11] Sever,[12] Turner,[13] and Wildervanck.[14] The triad is generally present in its entirety or in part in some members of successive generations. Turner described one family in which

Figure 2 (case 1). Anteroposterior view of knees. Note hypoplasia and lateral position of patella, external rotation of tibia and fibula.

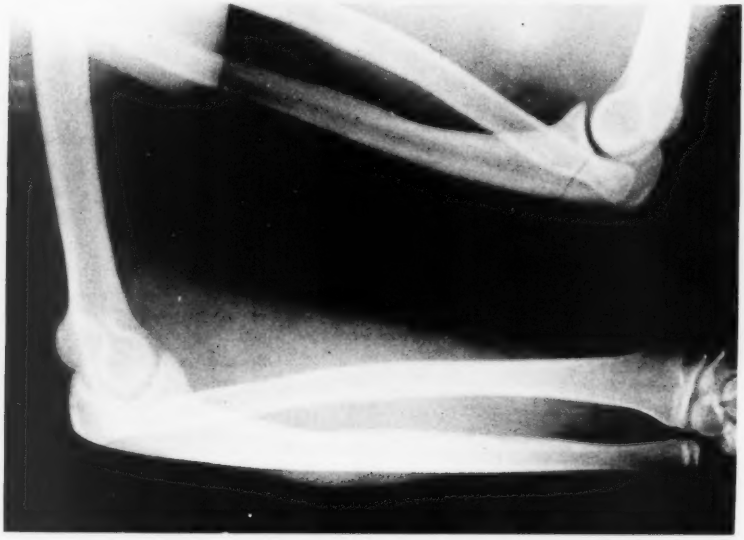

Figure 3 (case 1). Lateral view of elbows, showing position of radial head.

the arthrodysplasia and nail dystrophy were found in 26 of 39 members, and a second family in which 27 of 41 suffered nail dystrophy but only nine of these had the arthrodysplasia. Aschner, Senturia and Senturia, and Turner believe that the genealogy in this syndrome is of the non-sex-linked, dominant variety. Aschner has postulated that, "With such rare deformities it cannot be merely by chance that these defects are inherited together." She has explained the clinical data known about the syndrome by the phenomenon of linkage, with close neighborhood of linked characters.

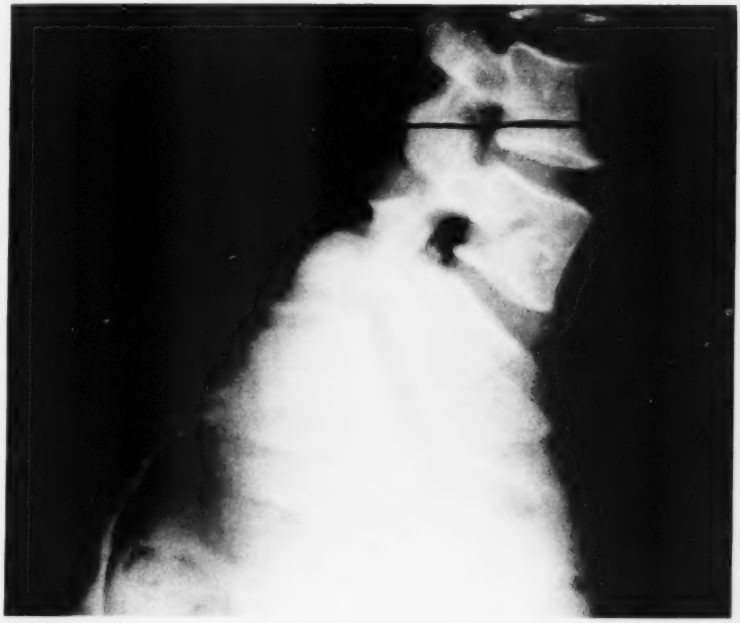

Figure 4 (case 1). Lateral view of lumbosacral spine, showing horizontal position of sacrum.

The defects are carried simultaneously by the mesoderm and ectoderm in three closely linked pathological factors. Since the triad does not appear as frequently as the combination of nail and patellar dystrophy, there must be a more intimate linkage between the genes for the patella and the nails than for the radial head. Other less plausible theories have attributed the anomalies to a single gene, or to a third inhibiting factor which is responsible for the arthrodysplasia when absent. Various supplementary anomalies have been described with the basic triad. Turner reported a dark, clover-shaped central ring in the iris about the pupil, an increase in the normal concavity of the external surface

of the ilium, and various minor bony aberrations about the shoulder girdle in some cases. In a patient described by Bates, "iliac horns" accompanied the syndrome. No previous record of a horizontal sacrum accompanying the triad could be found.

Figure 5 (case 2). Anteroposterior view of knees, showing particularly the shallow articular groove present on lateral aspect of lateral femoral condyle for articulation with the patella.

SUMMARY

An unusual hereditary syndrome, characterized by various combinations of dysplasia of the elbows and knees and dystrophy of the nails, is discussed. Four members of a family in which the triad has been transmitted through three known generations are reported. The sole disabling feature in the two living members was directly caused by the knee anomaly. Both the knee and the elbow abnormalities would be amenable to improvement by surgical correction at an early age.

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MEDICINE IN THE NEWS

We recognize that the public is interested in all things medical, particularly new and promising procedures. They are intrigued by articles on medical subjects that become available to them. No one should object to the dissemination of newsworthy information but it should be mature and reliable. Spectacular journalism should be discouraged. The physicians themselves are the most reliable sources of trustworthy information. We should furnish material on new or interesting medical subjects because it will tend to discourage some of the zealous lay writers and it will maintain the confidence and friendship of the people as patients.

—CHARLES SELLERS, M. D.
in *Detroit Medical News*
p. 18, Dec. 6, 1954

GASTRO-INTESTINAL PROBLEMS IN CHRONIC PULMONARY DISEASE

JAMES C. SYNER, *Captain, MC, USA*

IN treating patients with chronic pulmonary disease, problems involving the gastro-intestinal system arise which significantly affect the management of the total patient. Frequently the patient's primary concern is with his gastro-intestinal difficulties, while the physician concentrates on the pulmonary abnormalities. This is because the physician tends to focus on "findings" whereas the patient will focus on "symptoms." This is strikingly illustrated by the patient with bronchiectasis who is concerned with loss of appetite, "no taste" for his favorite foods, and weight loss, while the physician evaluates bacterial flora, character and amount of sputum production, and abnormal pulmonary physiology. Awareness of the patient's concern, apprehension, and anxiety over such difficulties is fundamental to optimum management of the total patient.

SCOPE OF THE PROBLEM

This presentation will be limited to gastro-intestinal problems secondary to a primary pulmonary disease, thereby excluding the following:

1. Gastro-intestinal problems arising either as a direct result of generalized systemic toxicity and spread of the primary process or from treatment complications in acute pulmonary diseases. This is illustrated by a staphylococcal pseudomucinous enterocolitis reported as a complication of antibiotic therapy employed to treat an acute, toxic lobar pneumonia in a patient without an underlying chronic pulmonary disease. Complications of this nature following the use of antibiotics have been reported previously.[1-3]

2. Chronic pulmonary disease resulting from a primary gastro-intestinal problem. This is illustrated by a bronchiectasis resulting from diseases of the esophagus, such as cardiospasm, peptic esophagitis with obstruction, and diverticulum producing recurring contamination of the pulmonary tree by secretions and food particles infected by mouth bacteria.[4]

3. A major form of anatomic disease demonstrated in the gastro-intestinal tract in a patient with a chronic pulmonary disease,

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where no causal relationship between the two could be found. This is illustrated by a gastric cancer, peptic ulcer, cholelithiasis, et cetera, in a patient with a chronic pulmonary disease.

METHODS AND MATERIALS

The data herein presented were obtained from a review of 604 patients managed on either an outpatient or inpatient basis in the medical chest section of this hospital. The presentation will be made in reference to two basic categories:

1. Gastro-intestinal problems arising directly from the disease process, for example, an inguinal hernia resulting from severe, explosive, paroxysmal cough in chronic bronchitis.

2. Gastro-intestinal problems arising as a complication of therapy, for example, nausea attending the use of potassium iodide.

The following criteria are applicable to the patients included in the statistical count:

1. The term "problem" is herein defined to be inclusive of both "signs" and "symptoms."

2. Patients have been followed over the course of several visits and/or hospitalizations in the medical chest section.

3. The pulmonary problems are of long standing, commonly of several years' duration.

DETERMINATION OF THE DIAGNOSIS

The cases presented herein include most of the usually encountered forms of chronic pulmonary disease (table 1). All diagnoses were well documented by careful, prolonged clinical observation and appropriate laboratory data. In almost all cases of bronchiectasis included in the article, a positive bronchogram demonstrating the characteristic anatomic changes supported the clinical diagnosis. In the few patients lacking bronchographic examination, evidence of ectatic degeneration was convincingly indicated by the clinical course, frequency of intercurrent respiratory infections, amount and character of sputum production, lung markings on roentgenograms, and moist, bubbling-type rales on auscultation.

Because of the natural history of the process and the characteristics shared by the three most commonly occurring diseases (table 1), careful consideration was given to the criteria herein accepted for establishing the final diagnosis. This was necessary because of the common occurrence of bronchospasm in bronchitis and emphysema, and the fact that a severe, persisting asthma or bronchitis finally can evolve into a state of progressive emphysematous decompensation. In this phase of the disease process the major problem is the emphysema and is to be so counted for

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the record. The criteria and clinical features used in this presentation are discussed in detail elsewhere,[5] and are in close agreement with those recorded in previous reports.[6–9] The fundamental "ground rule" for handling this problem is that "all that wheezes and squeaks is not asthma."

TABLE 1. *Diagnoses in 616 patients with chronic pulmonary disease reviewed for incidence and nature of gastro-intestinal problems*

Diagnosis	Number of cases	Percent of total
Bronchitis	195	31.65
Asthma	87	14.12
Emphysema	60	9.74
Tuberculosis	55	8.92
Bronchiectasis	47	7.63
Coin lesions	36	5.84
Hilar adenopathy	34	5.61
Pulmonary sarcoidosis	30	4.87
Bronchogenic carcinoma	18	2.92
Pulmonary fibrosis	18	2.92
Giant air cysts	12	1.93
Fungus		1.45
Histoplasmosis	4	
Coccidiomycosis	3	
Blastomycosis	2	
Pectus excavatum	8	1.29
Dorsal kyphoscoliosis	4	.64
Primary pulmonary hypertension	2	.32
Pulmonary arteriovenous fistula	1	.16

In our experience, pulmonary fibrosis, to some small degree, is a very common occurrence in patients with chronic pulmonary disease. It was so diagnosed for this study only when it was found to be the major pathologic change. A criterion of major significance in this diagnosis was a reduction of at least 1,000 ml in the total lung volume as determined by pulmonary function studies.

GASTRO-INTESTINAL PROBLEMS AND RELATION TO PULMONARY DISEASE

It is not a difficult matter to relate gastro-intestinal problems to treatment measures for pulmonary diseases. There is almost always a clear-cut relationship between the initiation of treat-

ment, the onset of complications, and the clearing of the difficulties on the withdrawal of therapy. In the absence of this cause-and-effect relationship between treatment and complications, it is very difficult to screen significant symptoms in patients who have chronic disease. The question arises whether it can be determined positively that symptoms arising in other bodily systems are the direct result of a chronic process elsewhere. This consideration entails an evaluation of the role played by functional (psychiatric) disturbances in giving rise to widespread symptoms and somatic reactions outside the system immediately involved. No attempt has been made to sift out functional from organic causes in the problems listed. Each complaint must be evaluated and analyzed in relation to the total problem. I prefer to adopt the point of view that the problems are of mixed origin, being both functional and organic. The implication is that in the absence of the chronic pulmonary disease the gastro-intestinal problems might not have arisen. Anorexia is a classical illustration of this consideration and will be discussed in detail in relation to chronic suppurative disease of the lungs.

Deciding what was to be counted as diarrhea posed certain difficulties. Two or three soft stools per day, even though representing a change from usual bowel habits, was not considered to be diarrhea. The presence of multiple, watery, painfully cramping bowel movements were the features characterizing diarrhea as used for this presentation. This is important in counting complications to broad-spectrum antibiotic therapy, for the presence of two or three soft stools per day, without abdominal cramping, was a rather common finding, whereas the presence of multiple, watery, painfully cramping bowel movements necessitating interruption of therapy was not a frequent complication.

The gastro-intestinal problems encountered and their incidence in the 616 cases are listed in table 2. The three occurring most commonly accounted for 68 per cent of the total complaints. Their distribution as complications of the disease or treatment measures also is given in table 2.

The counts on anorexia, nausea, and vomiting may appear higher than those observed by others. It may be that factors peculiar to mess procedures in the military were involved. However, conducting this review emphasized the importance of specifically interviewing the patient about problems outside the system of chronic involvement. The systemic review must be repeated frequently in following a patient with chronic disease. A great deal can pass unnoticed if one waits for the patient to volunteer information.

ANALYSIS OF GASTRO-INTESTINAL PROBLEMS

Anorexia, nausea, vomiting

In patients with chronic suppurative disease, anorexia is a common complaint. It is usually not a chronic problem, but reappears with enough frequency to concern the patient, provoke weight loss, and necessitate medical help and advice. The patient states the problem as one of experiencing a sensation of hunger which is lost almost immediately on sight of food or soon after a few mouthfuls have been taken. It is found more commonly in

TABLE 2. *Type, frequency, and probable cause of gastro-intestinal problems in 616 patients treated for pulmonary disease*

Problem	Number due to treatment	Number due to pulmonary disease	Total
Anorexia	23	95	118
Nausea	41	21	62
Vomiting	25	12	37
Abdominal pain	16	8	24
Dysphagia		10	10
Liver involvement (tender; palpable; abnormal chemistries)		8	8
Hernia			8
Inguinal, direct		7	
Inguinal, indirect		1	
Diarrhea	7	1	8
Difficult liver biopsy (Vim-Silverman needle)		4	4
Dehiscence (postoperative)		3	3
Clinical vitamin B deficiency	3		3
Stomatitis, pharyngitis, esophagitis	3		3
Ileus		2	2
Tracheo-esophageal fistula		1	1
Total	118	173	291

patients with bronchiectasis than in those with bronchitis, and particularly among those who produce copious amounts of foul, purulent, greenish sputum. Several factors, such as foul mouth taste, psychologic disgust toward raising sputum, and the effect of purulent sputum on gastric mucosa could be considered as causes. The association between gastro-intestinal complaints and the swallowing of purulent sputum has been previously re-

ported.[10] These authors described the results of gastropscopic examination and smears of gastric secretions in 17 patients with chronic pulmonary suppurative disease. Gastroscopic examination was normal in all but two patients, who demonstrated mucosal edema of the gastric antrum with localized atrophic gastritis. The authors did not consider these gastric mucosal abnormalities as being significant, since mucosal edema is a transient phenomenon which does not mean organic disease. These two patients did not have complaints. Six patients who did have gastro-intestinal complaints had normal gastroscopic and gastric-smear findings. Bockus[11] has stated that constant swallowing of mucopurulent material may develop chronic gastritis if achlorhydria is present.

A number of patients had linked their anorexia to the absence or diminution of taste. This could well be a complication of the chronic nasal involvement in patients with chronic bronchitis and bronchiectasis. The nasal mucosa appears edematous, inflamed, thickened, granular, covered with tenacious mucoid or purulent sinus drainage, and frequently presents the boggy, bluish discoloration associated with allergic disease. These changes could certainly inhibit the optimum function of the olfactory modality.

Nausea and vomiting have been infrequent findings in bronchitis and bronchiectasis. When they do appear it is usually in this sequence: a paroxysm of severe coughing, retching, and finally the production of vomitus. The patient may describe the experience as the "dry heaves." Some patients will vomit during and following the production of copious, foul, purulent sputum.

In emphysema, especially in advanced cases, anorexia is a frequent problem. Nausea and vomiting are infrequent. Most likely anorexia is the result of an uncomfortable feeling of fullness and distention after a few mouthfuls of food have been taken. The more advanced the degree of emphysematous decompensation, with flattened, fixed diaphragms and labored, fatiguing abdominal breathing, the more marked is the problem.

In the terminal stage of bronchogenic carcinoma, anorexia is almost always present. Nausea and vomiting are not infrequent, but are undoubtedly limited by the patient's restricted oral intake. The size of the pulmonary lesion does not appear to bear a relationship to these particular problems.

When pulmonary sarcoidosis is accompanied by significant parenchymal involvement of the lungs, anorexia can be a very troublesome problem. In particular, anorexia has been more frequent and severe when pulmonary function is significantly diminished. That it might be related to widespread visceral involvement cannot be ruled out. To date, about 75 per cent of our patients who had pulmonary sarcoidosis and who have had a biopsy of a

specimen of the liver had hepatic sarcoid with noncaseating granulomatous tubercles. Palmer[12] has demonstrated this kind of granulomatous lesion in biopsy specimens from the gastric mucosa.

Abdominal pain

This complaint is usually related to treatment measures (table 2). In cases where it was thought to be due to the disease process, severe, explosive cough seemed to be the common denominator. The effect of flattened, fixed diaphragms and labored abdominal breathing in emphysema may be responsible. The areas of pain are usually the costal margin and midepigastrium.

Dysphagia

This problem was identified almost exclusively in severe dorsal kyphoscoliosis and pectus excavatum. It appeared to be related to the interference with chest expansion and changes in position of mediastinal structures produced by the skeletal deformity. These patients all demonstrated significant diminution in the efficiency and capacity of their ventilatory performances.

Liver involvement

The presence of a palpable, tender liver resulting from chronic pulmonary disease was limited to the late stage of cor pulmonale. The basic pathophysiologic finding was passive congestion of the liver due to right heart failure with venous congestion. Abnormal liver chemistries were characteristic of hepatocellular damage.

Hernia

Although it cannot positively be stated that hernia is a direct result of cough, the dynamics of cough with its increasing of the intra-abdominal pressure presents a situation ideal for promoting herniation. The majority of patients with this complication have far-advanced emphysema with markedly flattened, fixed diaphragms and severe, explosive cough.

Diarrhea

The problem of diarrhea was almost always the result of treatment measures (table 2). Previous reports indicate that tuberculosis of the intestinal tract is a frequent, severe complication of pulmonary tuberculosis.[13] From this information one could expect diarrhea to be a common problem in pulmonary tuberculosis. In our recent experience, however, this has not been the case. As intestinal lesions are prone to occur during the early, active stage of tuberculosis, and rarely before the pulmonary lesion has been discovered, the use of current antituberculosis chemotherapy either diminishes or masks the symptoms of this complication. According to a report from Fitzsimons Army Hospital[13] approxi-

mately 25 per cent of pulmonary tuberculosis patients in sanatoria have clinical or radiologic evidence of intestinal tuberculosis. Intestinal involvement usually occurs in the ileocecal region (85 per cent) because of the affinity of *Mycoacterium tuberculosis* for lymphoid tissue. Spread from the lung may occur by direct extension via swallowing or by hematogenous or lymphatic spread.

Difficult liver biopsy

This problem was encountered only in patients with far-advanced emphysema. In addition to the obvious part played by lung volume inflation, flaring of lower rib cage, and flattened diaphragms in preventing the needle from reaching the liver, atrophy and fibrotic contracture of the liver may have been present. The four patients in whom liver tissue could not be obtained had been diagnosed as having Laennec's cirrhosis.

Dehiscence (postoperative)

This complication arose in patients with chronic bronchitis and emphysema who postoperatively had pneumonia with severe, explosive cough. The complication appeared to be directly related to the severity and dynamics of the cough.

Tracheo-esophageal fistula

This complication arose in a 56-year-old white man with advanced metastatic squamous cell carcinoma of the lung.

GASTRO-INTESTINAL PROBLEMS FROM TREATMENT OF CHRONIC PULMONARY DISEASE

Tables 2 and 3 summarize the frequency distribution and nature of gastro-intestinal problems arising as complications of treatment. The triad of anorexia, nausea, and vomiting was by far the most frequent and bothersome. There is little more in the way of detail that need be added to the information provided in the charts.

Recently a large number of outpatients were given short, periodic courses of wide-spectrum antibiotics (aureomycin (brand of chlortetracycline hydrochloride) and terramycin (brand of oxytetracycline)) in the management of intercurrent infections complicating such chronic states as emphysema, bronchitis, bronchiectasis, and fibrosis. To my knowledge only two or three of the total have had complications necessitating change or interruption of therapy. The usual schedule consisted of 250 mg of terramycin or aureomycin 4 times daily for 3 to 6 days. This schedule does not appear to carry the morbidity noted in heavy dosage schedules used for more acute, toxic infectious diseases.[2,3] Usually the problems can be controlled by having the patient take the medication with buttermilk immediately after meals.

TABLE 3. *Procedures and drugs causing gastro-intestinal problems in the management of chronic pulmonary disease*

Treatment	Problems encountered
Antibiotics	
Terramycin hydrochloride	Nausea, vomiting, diarrhea, anorexia, abdominal pain, vitamin B deficiency
Aureomycin hydrochloride	Anorexia, nausea, vomiting, diarrhea, abdominal pain, proctitis
Aerosol penicillin	Stomatitis, esophagitis, hairy tongue
Oxygen via nasal catheter	Stomatitis-pharyngitis-esophagitis (dysphagia)
Para-aminosalicylic acid	Anorexia, nausea, vomiting, abdominal pain
Triton (brand of alkyl aryl polyether alcohol) aerosol	Stomatitis-pharyngitis (dysphagia)
Aminophylline (orally)	Anorexia, nausea, abdominal pain
Potassium iodide	Anorexia, nausea
Elixir terpin hydrate and codeine	Nausea, vomiting, abdominal pain
Pneumoperitoneum	Anorexia, abdominal pain, constipation

The intra-abdominal complications and sequelae of pneumoperitoneum represented in this series have been limited and with no serious consequences. A recent report indicates an over-all incidence of significant complications of about 1 per cent.[14] Pneumoperitoneum has been definitely incriminated as contributing to the death of two patients.[14] Several patients were reported to have developed low-grade peritonitis with dynamic small-bowel obstruction. Reports in the literature describing accidents incurred as a direct result of air instillation include: (1) air embolism, (2) spontaneous pneumothorax, (3) inflation of hernial sacs, and (4) perforation of hollow or solid abdominal viscera. The use of pneumoperitoneum as treatment of far-advanced emphysema has been disappointing because of numerous complaints, usually from elderly patients, regarding such symptoms as: (1) tight abdominal fullness, (2) crampy pains, (3) anorexia, (4) diarrhea or constipation, and (5) inability to eat a full meal.

The appearance of vitamin B deficiency in three elderly men who were on antibiotic therapy was very striking. Stomatitis, cheilosis, atrophy of tongue papillae with magenta color, and dysphagia were the presenting problems. High vitamin B therapy

resulted in complete recovery in the presence of continued chemotherapy.

SUMMARY

Gastro-intestinal problems arising in 616 patients with varied chronic pulmonary diseases have been presented. They were considered as arising directly from the disease process or from the treatment measures used. Frequently the patient's primary concern is his gastro-intestinal difficulties, while the physician's is the pulmonary abnormality. Remembering to effect a careful systemic review of the patient at periodic intervals will prevent neglect of significant areas. Awareness of the patient's concern, apprehension, and anxiety over such difficulties is fundamental to the optimum management of the total patient.

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Squill, cinchona bark, iron infusions, and calomel have worked for a long time. Never mind if you can't say why.

—Martin T. Fischer

SERVICE ARTICLES

PROGRAM FOR MEDICAL PREPAREDNESS

MAJOR GENERAL SILAS B. HAYS
Surgeon General, U. S. Army

EACH OF THE four Surgeons General since 1939—Magee, Kirk, Bliss, and Armstrong—has served at least part of his term during a period of combat. I sincerely hope that my term will be wholly one of peace. Nevertheless, much of our effort in the immediate future must be devoted to problems of war. The radical changes in concepts and doctrine of war brought about by the development of nuclear weapons make it imperative that we modernize and improve our medical preparedness. The tasks we face are both essential and difficult. Their accomplishment will require a degree of enthusiasm and effort on the part of all concerned that is more characteristic of war than peace.

In facing these problems I am fortunate in having a capable and enthusiastic staff. With their help I have outlined a program which we believe will best accomplish the mission of the Army Medical Service. I want to present this program publicly so that interested persons within and without the Army can assess it, and by expressing their concurrences or differences help translate it into a practical plan of action. I chose this particular occasion to present my views because I know that you, experienced and interested in both military and civilian medicine, are best equipped and motivated to evaluate the program. I am confident that from you will come the frank constructive criticism that this broad program must have before it can be ironed into specific objectives and policies.

My talk today is oriented toward *medical* problems almost exclusively. At a future date it is my hope that similar statements will be made concerning problems and programs of the other components of the Army Medical Service.

MISSION OF THE ARMY MEDICAL SERVICE

The primary mission of the Army in peacetime is preparation for war. The Army Medical Service, as an integral part of the Army, must never lose sight of *its* role in accomplishing this mission. At the same time, as a supporting service, it has the equally important mission of maintaining and conserving the health of the Army during peace. I do not view these as separate

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missions but rather as one integrated whole. It is difficult for me to visualize an improvement in the care of the peacetime soldier that does not improve our ability to perform our wartime mission. Furthermore, to the extent that we fail to keep our peacetime soldier in the best possible health, to that extent we make the Army's task of preparing for combat more difficult.

MEANS OF ACCOMPLISHMENT

We in the Army Medical Service utilize three basic instrumentalities in performing our mission of conserving the fighting strength: first, selection, elimination, and classification of personnel; second, the practice of preventive medicine; and third, the practice of therapeutic medicine.

MANPOWER

In a major war, manpower will be the Nation's most critical resource, and every person, able-bodied or handicapped, must be utilized. An appreciable part of this program is entrusted to our stewardship. Although personnel selection, elimination, and classification do not have the humanitarian aspects associated with the care of the sick and wounded, our efforts in this area can do much to maintain an efficient, fighting Army. We establish physical and mental standards for induction and separation. If we set our standards too high, we eliminate many persons who could render satisfactory service. If we set them too low, we saddle the Army with noneffectives. If we do not assist in the classification of personnel, handicapped and ineffective men will be assigned to jobs beyond their capabilities, and able-bodied men to the jobs which require lesser capabilities.

We have learned much from our experience in World War II and, more recently, the Korean conflict. However, I believe that we have as yet not fully exploited our experiences. The time to test and to approve or discard such programs is now and not during mobilization. The area on which we intend to place particular emphasis is classification of personnel—the matching of capabilities of the individual person with requirements of the jobs to be performed in the Army. It is essential that we classify the physical, emotional, and mental qualifications of the person and the corresponding requirements of the job in a manner to facilitate proper assignments in the Army.

PREVENTIVE MEDICINE

The second instrumentality, preventive medicine—and I include preventive psychiatry in this term—has proved its value. For many years we in the Army have been leaders in this field and our efforts have paid off not only in the health of our troops but in the health of the whole Nation. When applied to preventive

medicine, the old adage, "a penny saved is a penny earned," should be changed to "a penny saved is two pennies earned"; for each soldier kept out of the medical stream another who would be required to care for him is freed for nonmedical duties. We do not intend to let the Army Medical Service rest on past laurels in this field. Current projects which show promise will be continued and I hope brought to successful conclusion. Remaining problems of preventive medicine will be sought out and studied.

The Army is now in one of the healthiest periods of its history. The noneffective rate exclusive of battle casualties, which is the most meaningful index of health in the Army, dropped from 20.2 per 1,000 strength per year in fiscal year 1953 to 15.8 in 1954 and 13.6 in 1955. However, our most recent data indicate that the noneffective rate is leveling off.

Despite recent advances, acute respiratory infections remain the major cause for admission of military personnel to hospitals and quarters. Incidence rates for acute respiratory infections have been higher at installations engaged in basic training than at other Army posts. Last winter the incidence rate for common respiratory infections and influenza at installations training recruits was almost two and one-half times as high as at posts with seasoned troops; the incidence rate for pneumonia was more than five times as high. Encouraging progress has been made—much of it here at Walter Reed Army Institute of Research—particularly concerning the cause of certain acute respiratory infections. However, much remains to be accomplished.

The prevention of injuries is another problem which requires attention. Admissions for injuries constitute only about a tenth of total nonbattle admissions to hospitals and quarters, but they account for one fifth of man-days lost and over two thirds of nonbattle deaths in the Army. Within the Army the primary responsibility for accident prevention is placed on G-1. There are, however, definite medical implications in the field of safety which we cannot shirk. In an endeavor to reduce the number of accidents, the Army has sponsored the Accidental Trauma Commission of the Armed Forces Epidemiological Board in several different projects. Studies are underway to determine, if possible, such things as accident proneness and psychiatric, psychologic, and social traits relating to personnel often involved in accidents.

Our over-all approach to psychiatric problems in the Army has shifted heavily to its preventive aspects. During World War II we learned many lessons and developed many policies and procedures which, when applied in the Korean conflict, resulted in a very appreciable saving of manpower. Not only were psy-

chiatric admission rates lowered, but so also were separations from the service for psychiatric reasons.

During the current state of peace, mental hygiene consultation services, division neuropsychiatric service, and other outpatient psychiatric services continue as the mainstay of psychiatric prevention and therapy. The effectiveness of our mental hygiene consultation service is reflected in the large percentage of persons returned to duty. Of 25,000 patients treated for psychiatric conditions last year, over 68 per cent were returned to duty; 26 per cent were recommended for discharge, mostly through administrative channels; and less than 6 per cent were referred to hospitals. Favorable results are also noted in the sharp decrease in both open and closed ward hospitalization rates for neuropsychiatric disorders and in lower separation rates. Currently these services are limited generally to posts of 18,000 strength or more. It is important to extend this approach to oversea areas and to smaller posts in the United States.

The principles of management of combat psychiatric casualties are almost deceptively simple, yet experience has shown that time and again the lessons of the past have been forgotten. One of the principal reasons for this has been the loss or dilution of the trained career officers in the interim between conflicts with a resultant lack of perpetuation of lessons learned. Nuclear war poses new problems in military psychiatry. In a mass casualty situation every physician will have to be a surgeon, and he will also have to be a psychiatrist. It is our intent to see that the principles of preventive psychiatry are fully emphasized and implemented, and that all medical officers receive some training in military psychiatry with particular emphasis on the problems of mass casualties.

Preventive medicine in the Army was originally concerned almost exclusively with prevention of infectious diseases and recent wars have stimulated concentration on preventive psychiatry. The concept of preventive medicine, however, is broader than this. In recent years civilian medicine, particularly industrial medicine, has made strides in considering the individual in relation to his job, keeping him fit for duty and at work. This requires study of both the man and the job. Leaders of industry have found that this approach, although it costs money, pays cold-cash dividends in higher production. I am convinced that we in the Army have a fertile field here which we have not cultivated sufficiently.

THERAPEUTIC MEDICINE

Our third instrumentality is the practice of therapeutic medicine and surgery in patient care. Our repute in the Army and in civilian medicine hinges largely on the quality of this care.

The Army Medical Service is proud of the high quality of professional care it renders. One concrete evidence of the standard of patient care in the Army is that out of 40 Army hospitals considered by the Joint Accreditation Committee, 39 have been fully accredited, one provisionally accredited, and *none* rejected. Today, reference to "medicine as practiced in the Army" is a compliment.

The quality of patient care is not self-perpetuating, however, particularly in the Army where conditions change frequently and sometimes radically. The over-all quality can be maintained only by achieving an acceptable standard for every factor contributing to it. This brings us to the major problem the Army Medical Service is facing today. The quality of our patient care is being threatened because of an imbalance between workload and resources. We have faced such imbalances in the past, but they were of a temporary nature. The current problem, however, will not disappear of its own accord and is bound to become more acute if left alone. Furthermore, the problem is complex and does not lend itself to a single one-shot solution. This problem has many facets—dependent care, the contraction of the Army, the 3 per 1,000 ratio, inadequate incentives for procurement and retention of medical officers, and the change in professional maturity of our doctors. All of these facets must be analyzed and thoroughly understood if a proper solution is to be found.

I have already mentioned the striking reduction in the noneffective rate of Army personnel. This favorable situation is at least partially due to the strong emphasis placed on outpatient care in recent years. It has not only helped reduce hospital admission rates but has contributed to the reduction of the duration of stay of hospital patients. This trend, in combination with the contraction of the Army and the elimination of the few remaining battle casualties from our hospitals, has resulted in a sharp drop in the total volume of patient care for active duty Army personnel. The inpatient load, measured by occupied beds, for active duty Army personnel in 1955 was only half of that in 1953, and even the outpatient load showed some reduction.

I would now like to contrast this experience with the trend in patient workload for families of military personnel. The number of dependents occupying beds in Army hospitals has not decreased, and the number receiving outpatient care has increased by more than one third in the last two years. There are a number of reasons for this increase. One is the tendency toward earlier marriages. The Army has changed from an organization of bachelors to an organization of married men. The most important factor, however, is availability of housing. The dependent

workload varies more with the availability of housing than with troop strength. Family housing on and near military posts is increasing. The net result is that care for military families has increased from a relatively small factor to one fifth of inpatients and one third of outpatients in Army facilities. In actual workload it is an even larger factor. The greater part of family care is in obstetrics and pediatrics, and these patients require considerably more of the physician's time than the average military patient. It is my estimate that 40 per cent of the time of medical officers engaged in patient care is concerned with families. Under the cross-servicing policy, personnel of the Navy and Air Force receive medical care in Army facilities and Army personnel are provided care in Navy and Air Force facilities. In terms of workload, we are in approximate balance with the Navy, but more Air Force personnel receive care in Army facilities than Army personnel in Air Force facilities.

The turnover rate of patients is an important factor due to the volume of work generated on admission and disposition. The length of patient stay in Army hospitals has decreased over 20 per cent in the last two years, requiring more of the physician's time per patient day.

Another important factor is that the size of Army hospitals in operation has decreased markedly. The average size of Army hospitals in the United States is now only two thirds of what it was in May 1953 when the ratio ceiling for medical officers was imposed. This is a direct result of reduced troop strength, the drop in hospital admissions, and the reduction in duration of hospital stay. The smaller the hospital, the more expensive the operation, not only dollarwise but also doctorwise.

OTHER RESPONSIBILITIES

The Army Medical Service has many varied responsibilities other than patient care. These responsibilities—research, training, advisory missions to foreign nations, mobilization planning, staff and command responsibilities—have not decreased, and some have increased in recent years. As one example, over 11 per cent of our medical officers in continental United States are currently involved in a large maneuver in Louisiana called operation Sage Brush. Most of these responsibilities are not related to the size of the Army but rather to its mission and deployment. These responsibilities are integral to the Army's basic mission of preparation for war as well as to the maintenance of a high standard of medical care during both war and peace.

THE WORKLOAD

Nevertheless, the Army is operating under a Medical Corps ceiling related to size of the active Army, and size of the active

Army alone. This ceiling of three medical officers per 1,000 active duty strength was barely adequate at the time it was imposed in May 1953 when the strength of the Army was over one and one-half million; it is inadequate to meet satisfactorily the minimum requirements of the Army under current conditions.

Long before the imposition of ratio ceilings on medical officer strengths, the Army had reduced medical officer utilization radically. As you know, before and during World War II, the Army utilized 5.5 and more medical officers per 1,000 strength. During demobilization when the strength of the Army dropped but battle casualties remained, the ratio rose to approximately 7.5 per 1,000. During the Korean conflict when about 15 per cent of total Army troop strength was engaged in Korea, the over-all ratio was 3.3 medical officers per 1,000 strength. Post-Korea reductions in troop strength raised this ratio only slightly, and it was immediately brought down by further tightening of belts. However, everything has its breaking point. The number of medical officers in training, research, and other essential military medical functions has already been reduced to a level which I believe is less than satisfactory. The noneffective rate has been leveling off so that it is unreasonable to expect any substantial further reduction. These factors cannot be expected to produce further savings to counteract the effects on the doctor ratio of reductions in the size of the Army and the increased family population.

At many posts the situation is already critical, and our high standards of professional care are jeopardized. This is manifested by the short time allotted to individual patients. Many medical officers can allow only 5 to 10 minutes per outpatient, with attendant possibility of missed diagnoses. Appointments for consultations frequently are distressingly delayed. The waiting time in outpatient clinics is excessive. Medical histories become all too brief, incomplete, and lacking in pertinent detail. Progress notes become infrequent, irregular, and incomplete. Medical officers are working long hours without leave; many work 70 or more hours per week. One cannot work at a "continuous sprint" without dire results. The number of official complaints from patients has risen. This imbalance of workload and resources cannot be allowed to continue.

The imbalance can be corrected only by reducing the workload or increasing the relative number of doctors or both. Possibilities of substantially reducing the *military* workload further is out of the question. As you know, a bill is before Congress to provide medical care for military families in civilian facilities, partially at Government expense. In the last couple of years several plans for care of military families have been evolved but all have been controversial, and at this time we have no

way of knowing just what kind of legislation, if any, the Congress will enact.

As I stated at the outset, we must constantly be prepared to support combat. If during peacetime the care of families becomes our *major* workload, it cannot help but de-emphasize our preparedness efforts. It is my hope that the Congress will pass legislation that will assure good medical care of Army families and provide for an effective distribution of this workload between military and civilian resources.

Aside from the humanitarian and professional aspects of the problem, family care is an essential factor in the morale of troops and, therefore, basic to the accomplishment of the Army mission. Medical officers, being both doctors and soldiers, will stretch their capabilities and endurance to the limit before they will deny service to a dependent requiring medical care. Provision of medical care to families is by force of circumstances being tightened up throughout the Army, but it cannot be eliminated nor can it be substantially reduced until other adequate provision is made for such care.

I have been discussing workload; now what about our personnel resources? At present only 35 per cent of our medical officers on active duty are in the Regular Army. Since July 1953, when the ban on resignations was removed, 459 medical officers have resigned, of whom 93 per cent had participated in our residency training program. Our losses by resignation included 184 board-certified officers. This represents a tremendous loss of skilled manpower—skilled not only in professional specialties but also to varying degrees in military competence. Our total losses since July 1953, including resignations, retirements, deaths, and other separations number 553.

Notwithstanding this serious loss of trained medical manpower, we have refused to lower our standards for commissioning in the Regular Army. During this same period we have received 372 applications for commission in the Regular Army Medical Corps. Of these, 58 have been rejected, 63 have either withdrawn their applications or refused their commissions when tendered, 64 are still in process, and 187 have been commissioned in the Regular Army. In brief, our losses since July 1953 have been 553 against gains of only 187, or a net loss in the Regular Army Medical Corps of 366 in this 27-month period. Obviously this situation cannot be allowed to continue if we are to have an Army Medical Service.

CAREER INCENTIVE

It has become obvious to all three military departments that radical action must be taken, and taken soon, to increase attrac-

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tiveness for the medical officer career. The Secretary of Defense in June appointed a "Task Force Organization to Explore Problem of Attracting Career Medical and Dental Officers." The findings and conclusions of the Task Force have been discussed. Specific programs for implementing the recommendations of the Task Force are being developed. We will do everything within our power to assist in the development of these programs and their implementation in the shortest time possible.

Direct increase in pay requires Congressional action. Increased pay through promotion in rank is, to a considerable degree, within the authority of the three military departments. Within the last month, we have secured approval for increased promotions in the Army Medical and Dental Corps. These approved promotions are now being implemented, and I am sure this will result in improvement both in recruitment and retention of Army medical and dental officers. The Task Force recommended that the doctor ratio be increased from the current 3.0 to 3.4 per 1,000 strength. Implementation of this recommendation would not only improve attractiveness of an Army career in the Medical Corps but would be the most direct and immediate means of enabling us to accomplish our varied and important missions. No definitive action has as yet been taken on this recommendation.

Congress, in extending the Doctor Draft Act until 1 July 1957, made two changes in the Law. First, it lowered the maximum age from 50 to 45; and second, it exempted those over 35 who had previously been rejected for commission because of physical disability. Based on preliminary surveys, it is estimated that there probably are a sufficient number of doctors in the eligible pool to meet our requirements through 1 July 1957 when the law expires. However, in May or June of 1957, it may be necessary to go into the Priority IV group. In this group are certain individuals who have had very short tours of active duty. For example, there are approximately 500 who have had less than 6 months of service, and 750 more who have had between 6 months and 12 months of service. The increase of the ratio from 3.0 to 3.4 would mean the calling up of something less than 1,000 additional physicians for all three services.

The problem is basically an imbalance between workload and personnel resources. On the workload side, the only possibility I see of reduction is some form of dependent care legislation; on the personnel resources side the only solution is an increase in the ratio. The first requires congressional action, the second is a matter of action of the Secretary of Defense and higher authority. The actual solution may be a combination of both. The long-range solution, however, must lie in a strengthening

of the Regular Army Medical Corps, with the concomitant necessity of calling up fewer two-year men.

With the expiration of the Doctor Draft a year and a half from now, the only doctors available for service will be those liable under the regular draft. In the hope that appreciable numbers of this group could have some degree of residency training, Doctor Frank B. Berry, Assistant Secretary of Defense (Health and Medical), developed his plan for deferment of individuals for the current and the next fiscal years. The numbers which are being deferred under this plan are not sufficient, in my opinion, to make available to us the professional competence which will be required.

The employment of civilian physicians is being exploited, even though this can help to solve only a part of our shortage problem. Recent increases in salary levels and more concerted recruitment have increased the number employed to 300 full-time equivalents. This actually represents a far greater number of civilian doctors utilized on a part-time basis. We hope to increase the number and the quality employed.

The impending shortage of specialists in the Army puts additional emphasis on our professional training program for the future. The most important factor in the high standard of our patient care in recent years is the increased professional competence of our military medical officers. The value of sound professional training programs emphasized by Kirk, Bliss, and Armstrong has been proved in dividends to our patients, to our doctors, and to the Army Medical Service. Our present professional training programs are geared to accomplish several purposes: to provide for our officers opportunities for continuity of training and education; to create for them programs by which they can acquire specialist training and keep abreast of recent medical advances; to maintain the high quality of medical care in the Army; and to attract career Medical Corps officers. I propose to retain these objectives.

TRAINING PROGRAMS

In order to accomplish these objectives we have placed major emphasis not only on our residencies and our intern program but also on what we consider an excellent postgraduate education program. I should like to outline briefly for you these programs and some of the problems associated with them.

Our residency program now covers 22 specialties. Residencies are being conducted at four of our major teaching hospitals in this country—Walter Reed, Brooke, Fitzsimons, and Letterman—and at Tripler in Hawaii. Internship programs are conducted at these, and at Valley Forge, Madigan, and Beaumont. Oppor-

tunities for residency training are afforded only to Regular Army officers. Although it is true that a Regular officer may resign from the service upon completion of his obligatory service, we hope that additional incentives will result in an increasing number electing to make the Army their career. The success of our residents in obtaining board certification has been most gratifying.

Like most teaching hospitals, we are oversubscribed in certain specialties and undersubscribed in others. The question is frequently raised as to whether or not our residency training in the specialties should be opened to Reserve officers. Recently we submitted to the Department of Defense a proposal to admit Reserve officers to our programs with the proviso that they be required to pay back an extra year above that required of the Regular officer. The proposal is currently under consideration in the Office of the Secretary of Defense. I think you will be interested to know, too, that on 1 September we started a two-year general practice residency at the U. S. Army Hospital, Fort Knox, for Reserve officers.

The Army Internship Program has proved to be an increasingly attractive one. Our primary objective in establishing this program, of course, is to interest these interns in a career as a Regular Army Medical Corps officer. That the program has succeeded only to a moderate degree in this respect is evidenced by the fact that only 44 out of 149 interns in our last class have been approved for commission in the Regular Army. We must do a better job of selecting interns who are motivated for the Army and a better job of selling them on the Army while they are interns.

Other postgraduate training for Medical Corps officers functions in two forms—the in-service short course program and the civilian institution program. Our teaching hospitals have always taken great pride in conducting such courses as the Kimbrough Urological Seminar, Symposium on Pulmonary Diseases, Recent Advances in Internal Medicine, Obstetrics and Gynecology Seminar, and many others. These courses have proved popular not only among service officers but to many civilian physicians as well.

The civilian institution program was created to provide training at universities throughout the country that could not otherwise be obtained by in-service courses. Last year, 59 medical officers received training in civilian institutions in courses varying from two days to 12 months.

HOSPITAL FACILITIES

The quality of medical care can be maintained only by achieving an acceptable standard for every factor contributing to it.

One of the weak links in this chain has been the physical inadequacy of our hospital plants to meet the requirements of modern efficient hospital operation. Many of our hospitals are not only in poor physical condition but were designed for a size and type operation which is radically different from the current situation. A replacement program for hospital facilities is necessary and has been started. The first increment was authorized in 1952 when funds were appropriated for seven permanent type hospitals. An example of the type of structure is the 500-bed hospital on a 1,000-bed chassis. Six hospitals are now under construction—at Fort Knox, Fort Belvoir, Fort Bragg, Fort Benning, Fort Riley, and Fort Monmouth. The seventh hospital, at Fort Dix, is still in the design stage.

Additional hospitals were authorized and funds appropriated in the 1956 Public Works Program. These hospitals are at Fort Leavenworth and Fort Jackson. It is contemplated that two additional hospitals, at Fort Meade and Fort Ord, will be included in the fiscal year 1957 Public Works Program. These projects are now being considered by the Department of Defense. At last we can say that a progressive construction program is under way.

MEDICAL STAFF PROBLEMS

I should now like to discuss problems more directly related to our preparedness mission. The probability of employment of atomic weapons in any future major conflict requires that we re-examine the organization and doctrine of medical service in the field. In fact, the Chief of Staff has directed that such studies be undertaken with the view to improving the combat potential of the Army. In part, these studies have been pointed toward the determination of the type of support units and the optimum ratio of such units to combat units required to win a two-sided atomic war.

As a result of these studies, a new command and staff structure of the Army in the field is under development and being tested in maneuvers. I am particularly anxious to see that the position of staff surgeons is in consonance with provision of an effective medical service. If surgeons, as special staff officers, are not immediately available to the major tactical commander, but separated by an intermediate headquarters, then medical matters must go through the intermediate headquarters with resultant modification and delay. Delay in medical matters can prove costly in terms of patient care and lives. Regardless of changes in organizational or functional concepts, the mission of the Army Medical Service "to conserve the fighting strength" will remain unchanged, and we must make sure that the Army Medical Service in the field is organized in a manner to best facilitate effective accomplishment of this mission.

We must re-examine the functions, structure, and composition of our medical units to assure their suitability to meet conditions of modern warfare. We may have to modify some and, perhaps, create new ones. This is a task that will require effort to assure that we come up with the best answers and do it as soon as possible. Be assured that we are working on these problems. We have established a Medical Service Combat Development Board for the testing of field equipment and have re-established the Medical Service Board to work on long-range problems of organization and operation of the Medical Service.

With the expansion of Army aviation we must place increased emphasis on Army aviation medicine. We are now training aviation medical officers and assigning them to headquarters of divisions, corps, and armies, to certain major aviation battalions and groups, and on an area basis. This training is primarily in the Air Force School of Aviation Medicine at Randolph Air Force Base.

We must also re-examine the doctrine and, perhaps, organization of medical service support beyond the immediate theater of operations. We must do this with a view toward possible commitment in a local or limited conflict such as in Korea as well as preparedness for total mobilization. We must take into consideration not only the new weapons but the higher mobility of the Army, the increased speed of patient evacuation and similar factors. Experience with air evacuation in Korea has taught us that the continental United States hospital system must be prepared for much more rapid expansion during the first stages of conflict, and must be more sensitive to fluctuations in casualty rates than was required previously. Each aspect of preparedness must be re-examined in light of current thinking, and plans must be adjusted accordingly.

We must, of course, continually re-examine our training programs to assure that they reflect the latest doctrine and concepts of modern warfare. All our training and educational activities must include the military aspects of medicine. In our residency program we are now setting aside one hour a month for the purpose of conducting a conference on military medicine. We require, too, that a Medical Corps officer located at each teaching hospital, who has the proper military background and experience, be designated as the co-ordinator of military medicine and that he be given the responsibility for this program. The application of military medicine is being stressed on all teaching rounds.

MASS CASUALTIES

In keeping with our responsibilities for national preparedness, we are putting considerable stress on the handling of mass cas-

ualties. One of our courses, "Medical Care of Atomic Casualties," has become so well known to all the military services, as well as to such other agencies as the American Medical Association, the Public Health Service, the Federal Civil Defense Association, the National League for Nursing, the American Hospital Association, and other groups, that we have had to increase our quotas from an original 32 participants to 100, and from 4 courses a year to 6.

Another course of this type which was developed and conducted for the first time last year is "Surgery in Acute Trauma." This course, or rather series of courses, was conducted at all of our teaching hospitals. The scope and content of these courses include early management and transportation of wounded, a review of types of wounds, débridement, shock, problems in the administration of blood and blood derivatives, acute renal insufficiency in war casualties, perineal wounds, peripheral blood vessel injuries, and many other aspects of acute trauma.

Both the Army Medical Service School and the Walter Reed Army Institute of Research, as well as our hospitals, conduct a large number of courses for Medical Corps officers that are particularly designed to cover aspects of medicine applicable to national preparedness. I intend that we continue and expand our teaching programs in this direction and that we put increased emphasis on teaching the technics to be used in the care of mass casualties, not only to medical officers, but to dental officers, nurses, Medical Service Corps officers, and medical enlisted men.

In a nuclear war, medical personnel will not be available in sufficient numbers to administer emergency medical aid to the large numbers of casualties, and this task must, in many instances, be performed by nonmedical personnel. Limiting mortality and maintaining unit fighting strength must become a primary element of training for nonmedical military personnel and should be reflected accordingly in training programs of the Army.

We have asked that the period devoted to medical problems be increased from 5 to 22 hours in the soldier's 16 weeks' basic military training. The Department of the Army has concurred in this plan in principle but finds difficulty in adjusting the basic training program to allocate the required time. Regardless of how many hours are finally allocated to medical subjects, we intend that each soldier, in the absence of medical service advice and supervision, be able to administer self-aid or first aid as it pertains to the control of hemorrhage; prevention and treatment of shock; positioning and treatment of fractures; care and treatment of open wounds; treatment of burns; artificial respiration; positioning of casualties with wounds of the chest,

head, neck, spine, and extremities; and have a working knowledge of sorting and transporting casualties.

RESEARCH

During peace, we must conduct research that will better prepare us to meet our responsibilities in war. We must not lose sight, however, that our responsibilities in war go far beyond front-line medicine. Our program must be broad in scope, involving both basic and applied research in fields which are immediately or reasonably related to the mission of the Army Medical Service. Needless to say, much of this research results in information which is as valuable and applicable to civilian medicine as to military medicine, just as much of civilian medical research has helped to improve the practice of medicine in the Army.

To conduct this research we have several installations which are specifically staffed and equipped. We also support clinical research at most of the named Army hospitals and the Army Area Laboratories and encourage such research at station hospitals where competent and interested personnel are available. We also support a rather large research program through some 380 contracts with universities and civilian hospitals covering 32 major areas. Much of our research is being directed toward four major causes of loss of military manpower. In the area of trauma the more important investigations are directed toward blood and fluid replacement, improved burn therapy, blood volume expanders, improved anesthesia, and vascular prostheses. In the area of communicable disease we are particularly concerned with respiratory disease, infectious hepatitis, enteric disease, virus and rickettsial disease, and immunization methods. As to radiation exposure, we are investigating biological dosimetry and radiation injury. Our research in psychiatric disorders is exploring the problems of stress, rapid treatment methods, and behavior problems. I believe that we have an effective research program. It will be continually evaluated to eliminate projects which are not important to military medicine and to emphasize projects in which the Army has a vital interest.

MEDICAL INTELLIGENCE

Our medical intelligence activities have broadened in scope and may have to be broadened still further. We cannot afford to continue to limit our medical intelligence efforts to preventive medicine aspects of military operations in foreign areas. Our responsibilities in the activities of the North Atlantic Treaty Organization, Southeast Asia Treaty Organization, and Inter-American affairs have placed on us the burden of becoming familiar with all phases of governmental and private medical

administration, practice, research, and training, as well as health and sanitary conditions in these countries. It is only through understanding a country's capabilities that we can assess the manner in which we can best help it or how it can best help us in our mutual defense efforts.

SUPPLY

Medical supply is an important factor in maintaining a high standard of medical care in both peace and war. For the first time we have a sizable reserve of supplies and equipment, valued at 97 million dollars, to lessen the impact of mobilization requirements. The major problem in the medical supply field at present is organizational. Despite the tremendous progress made in unifying medical supply operations of the three services, some proposals recently have been made which would, I believe, separate the control of medical supplies from the doctor, something which I consider neither desirable nor feasible, and which I will continue to oppose.

PROGRAM FOR MEDICAL RESERVE UNITS

The medical reserve program is in need of rejuvenation. Reserve medical units are the muscle of our preparedness. Of a total of 247 authorized Army Medical Reserve Units, only 186 are on an active status. Of the major units, however, 8 out of 9 hospital centers, 5 out of 7 convalescent centers, and all 60 of the general hospitals are currently active. Of the Table of Organization and Equipment (T/O&E) strength, only 42 per cent of medical officers, 30 per cent of total officers, and 9 per cent of enlisted are on the rolls.

There are about 4,500 Medical Corps officers in the Reserve components today, not including those on active duty. Of these, about 3,700 are in the Ready Reserve, but only about 1,400 are participating in training activities.

The new Reserve Forces Act of 1955 has teeth only for the individuals appointed under age 26 and after 10 August 1955. Others can participate or not as they choose. Unless excused under Department of Defense regulations (which by the way are still being staffed) individuals in the Ready Reserve each year must serve two weeks of active duty plus 48 drill or training periods or alternately 30 days of active duty.

Our office has recommended that the regulations being processed contain the following statement: "Such an individual who is practicing a profession—for example, medicine—in which he will be using substantially the same skills in civilian life as he would be called upon to use in the military service may be permitted to participate to whatever lesser extent is

considered by the military department concerned to be necessary to maintain his military proficiency." If this is approved for inclusion in the Department of Defense regulations, we will recommend that the implementing regulations of the Department of the Army require a minimum of 15 drill periods per year plus two weeks of active duty for the professional complements of hospital units.

RESERVE CORPS RECRUITMENT

I have discussed at length the problems of recruitment and retention in the Regular Corps. These problems are just as serious in the Reserve Corps. They do not seem as acute because the reserve components do not face the day-to-day problems of operation of a medical service nor care of the sick. Much of the personnel in both organizations is obtained through compulsion. For doctors, the immediate financial inducements of membership in the reserve are zero. Usually reserve activity means the doctor loses money even though he draws military pay for the time spent. The long-range financial inducement of retirement pay is, I believe, a definite factor in many cases, although probably more in the retention of men with considerable service rather than recruitment of new blood. The other inducement is patriotism or a sense of duty as a citizen. I believe that many doctors today sincerely consider that, in a major war, they can discharge their duty as citizens as well in civil defense activities as in a military unit. Furthermore, in peacetime civil defense requires very little time, and in wartime it probably means service in or near the individual's home community. This situation means tough competition for recruitment of doctors in the Reserve.

What can be done to put new life in our Reserve Program? First, I believe we should emphasize to the young man that during the compulsory period of Reserve Service, the officer can make a good start toward qualifying for retirement pay. We should do everything we can to ensure that the regulations that are promulgated provide that doctors of the professional complement of units do not have to attend the full 48 drill periods in order to be participating members of the units. Our Reserve Training Programs must be revitalized to emphasize those things which are important in *military* medicine, and yet are professionally oriented to capture the interest and enthusiasm of the doctor who is largely wrapped up in the practice of civilian medicine. Military surgery and the handling of mass casualties must be stressed as well as preventive medicine and psychiatry. In the last two years we have already made a start in this direction—but we must push further.

We should diversify our summer unit training. Recently, I have observed various types from the strictly tactical type of field training to the strictly clinical type of training in one of our large hospitals. I am convinced that each of our units should have a different type of training each summer, preferably at different locations. This will provide broader training and will stimulate interest. Recently, one of our Reserve general hospitals has requested that it do 30 days of active-duty training next summer in Germany. This suggestion is intriguing, and our office is going to give it careful study. In this day of air travel, I believe we should seriously explore the possibility of using large government transport planes to move, for example, a Massachusetts unit to Texas for two weeks' active duty, or a Texas unit to Colorado.

Recently, additional equipment for reserve medical units has been approved. We will push to see that it is issued during this and the next fiscal year.

The "Michigan Plan" has just been approved for a one-year trial in that state. This provides that general hospitals located in towns which are not large enough to completely support the unit may have satellite fragment units in adjacent localities. We shall watch this experiment with interest.

I should appreciate additional ideas and suggestions for revitalizing our Reserve Program.

CIVIL DEFENSE

I would like to mention our responsibilities with regard to civil defense. I personally believe that clarification of the role of the Army Medical Service in civil defense is one of the major problems requiring solution. Responsibility for civil defense by law is vested primarily in the several states and their political subdivisions. Yet, you will recall that in "Operation Alert" last June, the President promptly "proclaimed" martial law.

We in the Army Medical Service are vitally concerned with the problems of civil defense. We recognize that little distinction can or will be made between military and civilian casualties in the event of a nuclear attack on the United States. The civil defense problem is unsatisfactory in several respects. Fifty thousand casualties, to say nothing of eight million, present a problem taxing the imagination. Who will treat them, and where will they be treated? This involves people, transportation, facilities, and organization. The role of the Army in these areas is uncertain. How will they be treated? This involves medical principles and doctrine, and this is the area on which we are concentrating our work.

Some actions which have been taken and which are related to civil defense should be mentioned. We have developed plans at our various installations in the event of disaster or enemy attack, and have integrated these plans with local civil defense plans to the extent possible. I have mentioned previously our teaching programs which are in part directed toward the civil defense problem. We, with the Navy, Air Force, and United States Public Health Service, are sponsoring a "Medical Education for National Defense" program in a number of medical schools for the purpose of instructing medical students in the problems of national defense medicine. At present there are 15 medical schools participating in this program and it is planned that 10 more will be included next year. The Army Medical Service also sponsors a traveling instructional team which appears before medical societies, medical schools, and Army Reserve components teaching the handling of mass casualties.

We have published a technical bulletin on "Early Medical Management of Mass Casualties in Nuclear Warfare," which has been concurred in by both the Air Force and the Navy. It establishes doctrine, policy, and procedures for the early medical management of mass casualties in the medical services of the Armed Forces.

All Army Medical Service officer personnel, except Medical Corps officers, are required to take a 12-hour refresher course in emergency medical treatment. In all our courses in the Medical Service School at San Antonio, Tex., we are emphasizing the handling of mass casualties and the problems of nuclear warfare.

The Army Medical Service has had wide experience in handling casualties. Yet I would emphasize that we have never had any experience with mass casualties as we now conceive them; nor will we, except in a situation when the chips are down. We think we have some of the answers, but we know that there are many we do not have. We have a handful of men working on these problems; we should have 10 times as many.

SUMMARY

In summary, the double task of readjusting to a peacetime operation and improving our preparedness to support the Army either in a conventional or an atomic war presents many difficult problems.

Paramount is the need to rebuild the Regular Army Medical Corps. Without a strong, professionally qualified corps there can be little hope in achieving our objectives. This major problem is in itself composed of many individual problems—pay, promotion, assignment and rotation, prestige, and training—which must be attacked each in turn.

We must solve the family care problem not only to help us balance workload and resources, but to provide the flexibility that we need to direct our attention to the major mission of medical support of the Army in peace and war.

We must re-examine and improve the preparedness of the Army Medical Service in light of modern concepts of war. This involves research, doctrine, training, organization, our reserve program, and civil defense.

We must not overlook the less acute but equally important problems of the Army Medical Service. We must continue a sound construction program. We must improve utilization of manpower in the Army through better selection, elimination, and classification of personnel. We must not only maintain but improve our standards of prevention and treatment of disease and injury.

The program I have outlined is both ambitious and formidable but, considering mission and circumstances, no lesser goals can be established. It is a task that the Army Medical Service can hardly accomplish alone. But we are not alone. Our relationships with civilian medicine have never been better. Since World War II there has been a growing understanding and with it, strengthening of ties between civilian and military medicine. There now exists full appreciation throughout the medical profession, military and civilian, that as integral parts of the profession of medicine we are all working toward the same goal—to bring to the American people the best medical care possible—and that to achieve this goal we must work together. This meeting exemplifies this close relationship and promises continued co-operative effort between civilian and military medicine. With faith in the ability and dedication of the men and women of the Army Medical Service and our compatriots in civilian medicine, I feel confident that our goals will be achieved.

Undoubtedly the greatest stimulus to progress in health care and hospitalization in Korea since its liberation is military medicine. Most physicians of the ROK Armed Forces have a limited private practice. This is true, too, of the physicians in public health jobs. Most of the military physicians are potential fulltime civilian practitioners sooner or later. As they associate with Western-trained physicians in their military capacities, their professional knowledge is furthered and their potential in the practice of modern medicine is increased.

—JAMES T. RICHARDS, Lieutenant Colonel, MSC, USA
in *Hospitals*, p. 98, Oct. 1954

MEDICAL EDUCATION FOR NATIONAL DEFENSE

Progress Report

The MEND Program was described in the October 1955 issue of this *Journal* as a means of supplementing medical curricula with additional information that might contribute to effective service by the medical graduate in time of national emergency. As of 1 January 1956, 10 more medical schools had joined the Program. These are Temple, Maryland, Duke, Louisiana State, Michigan, Pittsburgh, Washington (St. Louis), Kansas, California (Los Angeles), and New York University. In addito the 25 schools in full affiliation with MEND, 7 other schools are participating without, at this time, receiving any financial assistance.

Activities sponsored by the MEND Committee for the spring semester include the following symposia:

INFECTIOUS DISEASE PROBLEMS

This symposium, to be held at Great Lakes Naval Training Center, Chicago, Ill., on 14-16 February 1956, is designed to bring to the attention of professors of public health, preventive medicine, bacteriology, internal medicine, and pathology the communicable disease problems encountered by the military services. The program will include formal papers, group discussions, and visits to the laboratories of Naval Medical Research Unit No. 4. The Navy is primary sponsor of the symposium, with participation of Army, Air Force, Public Health Service, and medical faculty personnel.

RADIOBIOLOGY

Walter Reed Army Institute of Research, Washington, D. C., will be host to this symposium on 9-11 April 1956. Problems arising from human contact with all types of radiation and radioactive materials will be taken up in papers and panel discussions that will cover acute and chronic aspects of radiation disease from flash burns to genetic effects. Further discussion will be concerned with medical problems expected to appear from increasing use of nuclear reactors in civilian enterprise and in military operations. The Army is primary sponsor, with participation by other agencies of the Government and by faculty members.

Medical officers of the Armed Forces are invited to attend these symposia on a space-available basis. Any officer interested in further details should contact the National Coordinator, MEND Program, Bureau of Medicine and Surgery, Department of the Navy, Washington 25, D. C.

Clinicopathologic Conference

U. S. Naval Hospital, San Diego, Calif.*

MELENA, FEVER, AND PAIN

Summary of Past Clinical History. A 69-year-old retired naval officer was first admitted to the hospital as a medical emergency, having had a sudden episode of hemorrhage from the bowel. He had been retired in 1947 because of glaucoma. On the morning of admission, he vomited blood and passed a black stool. He became quite weak but did not complain of pain. In 1935 the patient had a somewhat similar episode and examination revealed a duodenal ulcer. A gastroenterostomy was performed, and the patient had received no medication since that time.

FIRST ADMISSION

Physical Examination. The patient was a well-nourished, well-developed, co-operative male in no acute distress, but appearing pale and weak. The blood pressure was 112/70 mm Hg; the pulse was 100 per minute. There were no other significant findings except for a hemoglobin of 9.3 g per 100 ml; hematocrit, 30 ml per 100 ml. White blood cell count was 7,000 per μl with a normal differential. Urinalysis and serologic tests were negative.

Course in Hospital. There was a consistent, daily, intermittent fever. A whole blood transfusion elevated the hemoglobin to 10 g per 100 ml. At no time did he complain of pain and there was no recurrence of vomiting. The black stools persisted for two or three days and then the patient became constipated. Mild laxatives were necessary to relieve the constipation. His febrile course was significant in that every 24 to 48 hours he would have a shaking chill, and the temperature would range to 103° or 104°F and then subside. These febrile episodes were not associated with any pain or distress. Febrile agglutination tests and repeated blood smears for malaria studies were negative. White blood cell count was 17,900 per μl, with 78 per cent segmented neutrophils, 7 per cent band neutrophils, and 15 per cent

*Rear Adm. Robert M. Gillett (MC) USN, Commanding Officer. From the Pathology Service, Capt. John S. Shaver (MC) USN, Chief.

lymphocytes. Stool examinations were negative for pathogenic protozoa. After approximately six days of chloroquine phosphate therapy, there was no apparent improvement or change in his febrile state, and the patient was given a combination of penicillin and streptomycin sulfate. Blood cultures prior to this antibiotic therapy were consistently negative. Following penicillin and streptomycin sulfate therapy, the patient's fever rapidly subsided and he became afebrile. His immediate course in the hospital was also complicated by intractable hiccoughs which lasted about 10 days.

Gastro-intestinal studies with contrast medium were reported positive for a large duodenal ulcer. Gall bladder studies with intravenous dye revealed a faint gall bladder outline.

The patient's subsequent course of hospitalization was uneventful. He became ambulatory, felt very well, slept well, and was troubled only with a mild intermittent constipation. He was discharged from the hospital in an asymptomatic state to be followed as an outpatient.

PRESENT ADMISSION

The patient was readmitted to the hospital 26 days later complaining of severe pain in the right sternoclavicular joint, fever, excessive sweating, and thirst. The pain was described as being severe, constant, and sometimes "throbbing" in character. His fever began four days prior to his readmission and was associated with drenching night sweats. There was no headache and no other joints were involved.

Physical Examination. The patient was an alert, active, apprehensive white man with a florid complexion and a warm, moist skin. Temperature was 101.8°F; pulse, 110, regular; blood pressure, 120/85 mm Hg. An electrocardiogram revealed only a sinus tachycardia. The cardiac impulse was visible over the whole left chest. Findings of an abdominal examination were not remarkable. There was no edema or vein distension.

Laboratory Studies. At this time the red blood cell count was 3.5 million per μl; hematocrit, 33 ml per 100 ml; white blood cell count, 10,600 per μl, with 73 per cent segmented forms, 2 per cent band forms, and 25 per cent lymphocytes. Urinalysis showed 10 mg of albumin in a random sample; blood urea nitrogen was 10.3 mg per 100 ml. Blood cultures were negative. Radiographs of the chest showed a moderate elevation of the right hemidiaphragm with only 66 per cent range of normal excursion. Two large discoid densities were present in the right lung base, one in a posterior position and the other situated anteriorly (fig. 1). A gastro-intestinal roentgenogram and fluoroscopic study showed an "active duodenal ulcer." The gastrojejunostomy was reported as functioning normally (fig. 2).

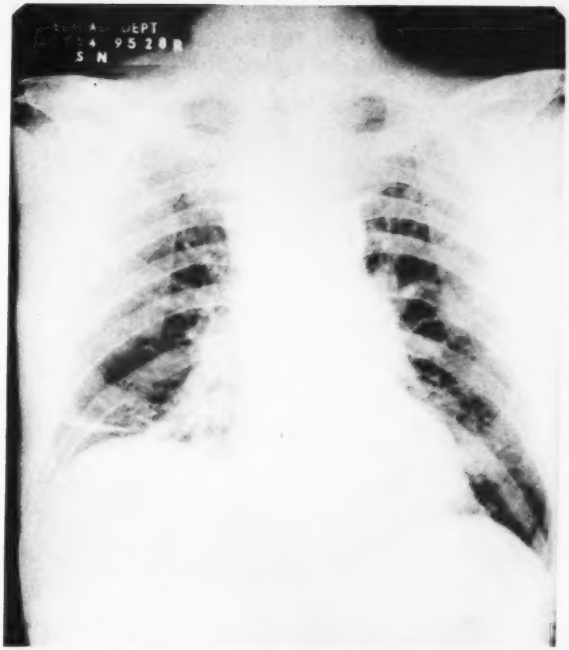

Figure 1. Roentgenogram of the chest, showing elevation of right hemidiaphragm and two large discoid densities in the right lung base.

Course in Hospital. Treatment consisted of thorazine (brand of chlorpromazine hydrochloride), luminal (brand of phenobarbital), and chloroquine phosphate. The fever, shaking chills, and right shoulder pain continued. On the 10th day of his second hospitalization a bronchoscopic examination showed no abnormal findings except for a moderate mucosal pallor. The abdomen was soft, and no palpable masses were evident on physical examination. A short time after the bronchoscopic procedure, the patient's blood pressure suddenly dropped to 96/48 mm Hg. The pulse rose to 140 per minute, and respiration became shallow with a rate of 40 per minute. The temperature was elevated to 105°F. Physical examination showed dullness, decreased breath sounds, and coarse rales over the right lower lung field with clinical signs of elevation and splinting of the right diaphragm. There were some decreased breath sounds over the left lower lobe, but no rales or dullness to percussion. On the following day re-examination revealed absent breath sounds on the right side of the chest with marked tenderness over the posterior area of the right chest wall. A roentgenogram revealed massive pleural effusion

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of the right side with approximately 40 per cent collapse of the right lung. On the evening of the same day, the patient became very dyspneic, lapsed into coma, and died.

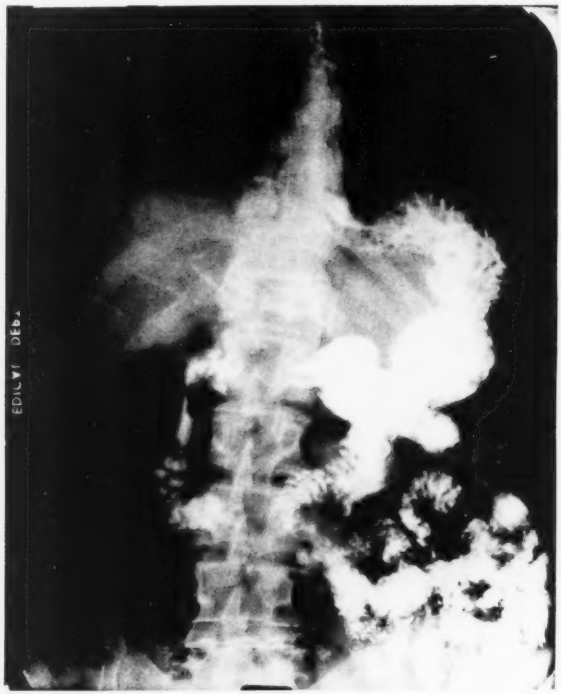

Figure 2. Gastro-intestinal roentgenogram, showing an "active duodenal ulcer."

DISCUSSION

Doctor Sheppard:* In view of the history and clinical findings in this case, we must consider the probability that the patient did have a subdiaphragmatic abscess. Presumably, the terminal episode represents a very good possibility of a rupture of a subdiaphragmatic abscess into the right pleural space with a resulting empyema and massive compression pulmonary atelectasis. A chronic duodenal or gastric ulcer with lesser peritoneal cavity adhesions could silently rupture into the upper abdomen and result in a subdiaphragmatic abscess, and could burrow through the right hemidiaphragm to produce a massive purulent effusion into the right pleural space. There are many lesions other than ulcer that could result in an infection in the upper abdominal area and produce the same course of events. A suppurative cholecystitis with rup-

*Lt. Haynes W. Sheppard (MC) USNR, Thoracic Surgery.

ture or infection from the stomach via lymphatic or blood stream could result in a subdiaphragmatic abscess; however, this would be less likely than direct extension from involved viscera. This patient had a gastroenterostomy, in addition to his ulcer, as indicated by radiographs and by the clinical history, and it is quite possible that a marginal ulcer existed with perforation, resulting in a diaphragmatic abscess. Occasionally, a fulminating appendicitis with rupture may extend retroperitoneally into the right subdiaphragmatic space and produce the same clinical picture. One possibility that comes to mind in reference to a thoracic problem that could result in a rapid demise of a patient, as appeared to be the situation in this case, is the spontaneous rupture of the esophagus. However, I think this possibility can be excluded in view of the fact that the mediastinal emphysema usual in such cases was not apparent in this case. Also, ruptures of the esophagus, with the usual complications, are predominantly on the left side rather than in the right pleural space. An acute fulminating pneumonia with effusion could produce symptoms as rapidly as we have here, with sudden demise of the patient. I think that obscure malignancies of the pancreas, stomach, duodenum, or any of the upper abdominal organs with rupture and infection in the retroperitoneal space could well produce symptoms similar to those present in this case. If I were called upon to make a definitive diagnosis, based upon clinical history, signs, and symptoms, I would say that the patient had a rupture of a duodenal ulcer with formation of a subdiaphragmatic abscess and subsequent perforation of the diaphragm with spilling of the purulent material into the right pleural space. May we look at the roentgenograms?

Doctor Wulfman:* Many radiographs were taken. The gastro-intestinal series made upon the patient's first admission show a functional gastrojejunostomy. The duodenal cap is not filled out, but appears defective. The emptying time of the stomach and duodenum was a little more than five hours. No marginal ulcer is evident at the site of the gastrojejunostomy. A repeat gastro-intestinal series during the latter part of the patient's first admission was done, and we failed to find any lesion except for the defect previously described in the duodenum. On the first day of the patient's second hospitalization, two radiographs of the chest showed elevation and a fuzzy contour of the right diaphragm. This suggests some pleural reaction. Also some atelectasis of the right lower lobe is evident. A portable film made shortly before the patient died shows a paradoxical motion as well as limitation of excursion of the dome of the right diaphragm. Radiographs of the gall bladder with radiopaque dye contributed nothing significant. In conclusion, we were looking for a lesion in the stomach to account for a presumed subdiaphragmatic abscess. Numerous spot films were taken of the upper gastro-intestinal tract, and we are unable to find any lesions other than the defective duodenum, which was known to have been present from the beginning of the patient's illness. Our radiographic impressions

*Comdr. William A. Wulfman (MC) USN, Radiology Service.

are: gastrojejunostomy with no associated abnormality; active duodenal ulcer; right subdiaphragmatic abscess with paresis of the diaphragm; massive pleural effusion, right; and compression atelectasis, right lung.

Doctor Davis:* I followed this patient on the ward and would like to add something that might be helpful to the history, which is not quite complete. It was my considered opinion, after examining him, that this patient had a subdiaphragmatic abscess. We entertained all of the possibilities as to the cause of a subdiaphragmatic abscess. Inasmuch as he had had duty in widespread areas of the world, it was believed that amebiasis might constitute a reasonable explanation for the elevated diaphragm and for the septic type of clinical course. Repeated stool examinations were negative for *Endamoeba histolytica;* however, because of the seriousness of his illness, the patient received treatment for amebiasis for six days. This failed to influence the clinical picture. Upon his first admission, our first problem became one of nursing because of intractable hiccoughs. As you know, intractable hiccoughs at this age is usually an ominous symptom, and we were of the opinion that this patient was quite seriously ill for a considerable period of time. He received combined penicillin and streptomycin sulfate therapy for at least two weeks. The hiccoughs ceased, the fever slowly subsided, and the patient became asymptomatic. He was discharged from the hospital because he desired to go to his home and because he felt well. He was seen in the outpatient department once a week and was asymptomatic.

Twenty-six days after discharge from the hospital the patient was readmitted because of shaking chills and a septic type of temperature. This second episode began to develop two days prior to entrance to the hospital. We thought of the possibility of a posterior perforation of his duodenal ulcer. However, in my experience, it is unusual to have a posterior duodenal ulcer rupture without some clinical signs, at least some pain. This patient had no pain and no evidence of abdominal rigidity. Repeated gall bladder studies revealed a functioning organ without evidence of calculi. A diagnosis of acute pyelonephritis with complications was entertained; however, this was excluded as a causative factor in view of the negative pyelograms and urinary studies.

Clinical diagnoses:

1. Duodenal ulcer, perforated
2. Subdiaphragmatic abscess, right
3. Pleural effusion and pulmonary atelectasis

Dr. Sheppard's diagnoses:

1. Chronic duodenal ulcer, perforating type, lesser peritoneal cavity
2. Subdiaphragmatic abscess with perforation of right hemidiaphragm
3. Empyema, right, with compression type pulmonary atelectasis

*Comdr. George M. Davis, Jr. (MC) USN, Medical Service.

PATHOLOGIC FINDINGS

Doctor Bench:* At autopsy, 1,000 ml of thick, purulent exudate was found in the right pleural cavity. The right lung was collapsed and covered by a similar fibrinopurulent material. No abscesses or areas of consolidation were evident in the lung parenchyma. A perforation with ragged edges, measuring 4 cm in diameter, was present in the dome of the right diaphragm, and this communicated with the pleural cavity above and with a large subdiaphragmatic abscess below. The liver parenchyma was not involved However, there was indentation of the diaphragmatic surface of the organ by the large abscess between the liver and the diaphragm. Exploration of the gastro-intestinal tract showed a normal esophagus. The stomach was distended with chyme, and arising from the posterior wall of the midfundal area was a large, gray-pink, lobulated, moderately firm tumor mass which measured 10 by 7 cm. Approximately one fourth of the tumor extended into the lumen of the stomach, while the greater portion extended posteriorly into the lesser peritoneal cavity. The lesion appeared to be originating in the muscle coats of the gastric wall (fig. 3). On the mucosal surface,

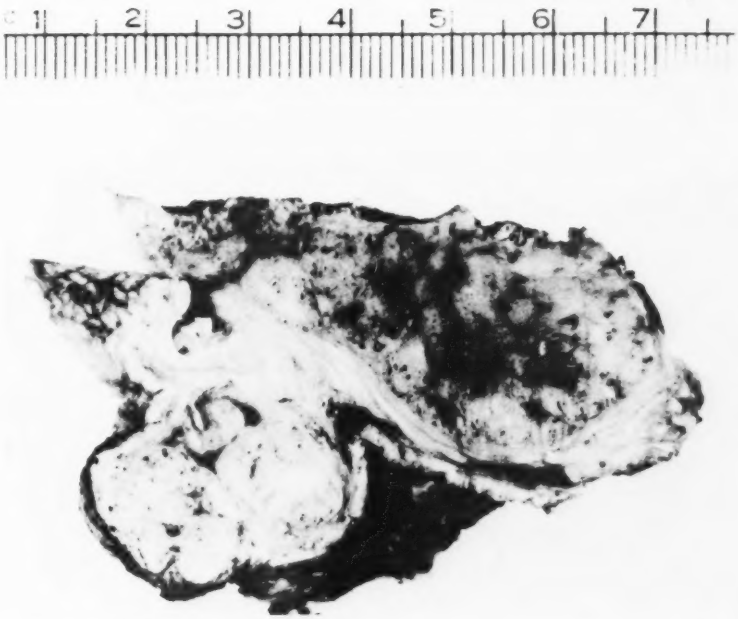

Figure 3. Cross section of gastric lesion, showing the nonencapsulated, lobulated structure. The dark, mottled, or mosaic pattern of the cut surfaces is due to hemorrhage and necrosis.

*Lt. Robert K. Bench (MC) USN, Surgical Service.

the lesion produced a "volcanic" type mass with a central crateriform ulceration which measured 2 cm in diameter and approximately 3 cm in depth. The edges or borders of the ulcer were ragged; the ulcer extended deeply into the mass, and was partiallv filled with necrotic and bloody material. An area of hemorrhage measuring 4 cm in diameter was present in the central portion of the tumor mass. There was no evidence of perforation of the ulcer into the lesser peritoneal cavity; however, fibrinous and fibrous adhesions extended between the serosa covering the lesion and the wall of the lesser peritoneal sac.

The gastrojejunostomy was patent and apparently had been functioning properly. No marginal ulcers were found, and careful examination of the duodenum showed no evidence of mucosal ulceration. No tumor masses other than the large gastric lesion were found. The liver, except for the depressed parenchyma beneath the subdiaphragmatic abscess, was not unusual. The gall bladder appeared normal. Microscopically, the large gastric neoplasm was composed of uniform, interlaced bundles of smooth muscle cells. Mitoses were very rare, and there was no evidence of hyperchromatism of the cells. Focal areas of necrosis were common in the central portion of the tumor along with extensive areas of hemorrhage. No distinct capsule was evident about the tumor mass. Several histologic stains, including hematoxylin-eosin, Masson's trichrome, and phosphotungstic acid-hematoxylin preparations, were carried out, and the microscopic features were characteristic of a leiomyoma (fig. 4).

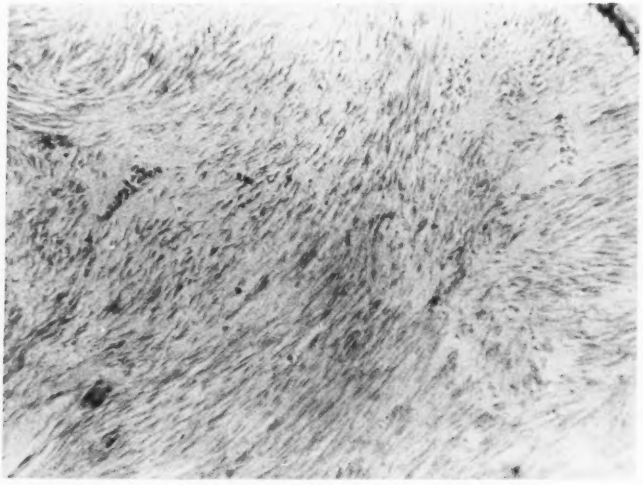

Figure 4. Photomicrograph of section of leiomyoma of gastric wall, showing proliferating, spindle-shaped smooth muscle cells that are fairly uniform in size and tend more or less to align in a palisade type configuration. (× 180)

Although no sinus tract could be found between the gastric lesion and the right subdiaphragmatic area, it is assumed that the subdiaphragmatic abscess was secondary to an inflammatory process which had its beginning in the gastric ulcer overlying the leiomyoma. The gastric ulcer apparently resulted from pressure necrosis or ischemia of the gastric mucosa by the unusually large leiomyoma, with subsequent erosion and extension of the inflammatory process into the deeper layers of the tumor. Both fibrinous and fibrous adhesions extended from the serosal surface of the tumor in the lesser peritoneal cavity, and it is probable that the infection reached the right diaphragm via this route.

In conclusion, I might add, that although the leiomyoma is probably the most common of benign gastric lesions, it is definitely uncommon for these tumors to become large enough to produce symptoms.

Anatomic diagnoses:

1. Leiomyoma, gastric (posterior; midfundal), with necrosis, hemorrhage, and ulceration
2. Abscess, subdiaphragmatic, right, with perforation into right pleural space
3. Empyema, right (1,000 ml)
4. Pulmonary atelectasis, right, compression type

SKEPTICISM IN THERAPEUTICS

One should not be unreceptive to new ideas, but as Osler suggested, one should hold an active skepticism toward new methods and new agents. Simply because some investigator has made a glowing report of the effectiveness of an agent does not always lead to the fact that others can obtain the same effect. This is no reflection on the writer or his scientific honesty or ability. Rather, it is the recognition that enthusiasm at times may color judgment. It has been said that the effectiveness of the therapeutic agent is often proportionate to the personality of him who gives it.

—WILLIAM H. GORDON, M. D.
in *Texas State Journal of Medicine*
p. 693, Oct. 1954

CASE REPORTS

Cushing's Syndrome Treated By Bilateral Total Adrenalectomy

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ROBERT E. BLOUNT, *Colonel, MC, USA*

CUSHING'S syndrome, a rare malady occurring predominantly in young women, is a metabolic disorder manifested by moon facies, buffalo type adiposity, hyperglycemia, and impaired glucose tolerance, hirsutism, amenorrhea, muscular weakness, osteoporosis, acne, purplish striae, and, frequently, hypertension. Cushing[1] originally attributed this clinical picture to overactivity of the basophilic cells of the pituitary gland and believed that the causative lesion might be basophilic adenoma of the pituitary gland. He recognized, however, that primary adrenocortical hyperfunction could produce the same clinical picture.

Basophilic adenomata are not always accompanied by the characteristic signs and symptoms of Cushing's syndrome, and in the majority of cases of this malady, no evidence of basophilic adenomata have been found. All the manifestations of this syndrome can be explained on the basis of excessive adrenocortical activity. Basophilic adenoma of the anterior pituitary, hypothalamic lesions, functional neoplasms of the adrenal cortex, and hyperplasia of the adrenal cortex have been found, in different patients, to produce the clinical picture of this entity. Hyperplasia of the adrenal gland is the most commonly incriminated lesion.

The pathologic physiology of Cushing's syndrome and the management of a patient treated at this hospital by bilateral, total adrenalectomy are discussed in this article.

PATHOLOGIC PHYSIOLOGY

The exact basic mechanism involved in this syndrome is not known. The manifestations of the syndrome, however, are known to be associated with overproduction of the adrenocortical hormones and result from abnormalities of the hypothalamic-anterior pituitary-adrenocortical system. It seems reasonable to assume that the mechanism of production of Cushing's syndrome is not always the same. Lesions of the hypothalamus may produce excessive stimulation of

From Brooke Army Hospital, Fort Sam Houston, Tex.

the anterior pituitary gland, resulting in overproduction of adrenocorticotropic hormone, bringing about adrenocortical hyperactivity. Functional basophilic adenomata of the anterior pituitary gland with overproduction of adrenocorticotropic hormone likewise would cause adrenocortical hyperactivity and the same clinical picture. Functional neoplasms and primary hyperplasia of the adrenal cortex also result in hyperadrenocorticism. The high incidence of hyperplasia of the adrenal cortex in patients without pituitary basophilism indicates that Cushing's syndrome results from overproduction of adrenocorticotropic hormone and direct overstimulation of the adrenal cortex. Increased susceptibility of the adrenal cortex to stimulation by the adrenocorticotropic hormone must also be considered. In any event, whatever factors may exist in Cushing's syndrome, the final picture is of adrenocortical hyperfunction.

In a simplified concept of adrenal cortical function, three groups of hormones may be considered[2]: (1) the glycogenic, (2) the electrolyte-controlling, and (3) the androgenic and estrogenic steroids. In Cushing's syndrome the glycogenic steroids, predominantly, are produced in excess. These steroids (11-oxysteroids) bring about increased gluconeogenesis, protein antianabolism, glycogen storage, and inhibition of the action of insulin. The antianabolic effect on tissue protein results in the appearance of osteoporosis, thinning of the skin, striae, and muscular weakness. The increased gluconeogenesis, excessive glycogen storage in the liver (leading to glycogenolysis), and inhibition of the action of insulin result in impaired glucose tolerance and hyperglycemia. This form of diabetes, of course, is resistant to insulin therapy.

The electrolyte-controlling steroids (desoxycorticosterones) are not controlled by corticotropic stimulation, but rather by levels of serum electrolytes. They cause increased sodium resorption by the renal tubules and thereby retention of water, and the increased excretion of potassium. This may be the mechanism of the hypertension that is observed in some patients with Cushing's syndrome. Because the production of this hormone is not dependent on stimulation by adrenocorticotropic hormone, its formation in excess in some cases of Cushing's syndrome (other than in cases of functional adrenocortical neoplasm or primary adrenal hyperplasia) is not entirely understood. The glycogenic hormones, however, also have some influence over sodium retention and potassium loss, and are probably responsible for the development of hypertension in these patients.

The production of the androgenic and estrogenic steroids (17-ketosteroids) is dependent on stimulation by adrenocorticotropic hormone. When produced in excess, these hormones produce hirsutism and amenorrhea in the female and impotence in the male.

The explanation of the development of buffalo type adiposity and moon facies is unknown. The adrenal cortex may produce another, as

yet unidentified, substance that affects fat metabolism or storage. These phenomena may also be secondary to a disturbance of fat metabolism secondary to the known disturbances of carbohydrate and protein metabolism.

CASE REPORT

A 29-year-old man was admitted to this hospital on 15 March 1954 complaining of frontal headaches and recurring ankle edema of about two years' duration. During a routine physical examination in 1952, he had been found to be hypertensive and was hospitalized. Blood pressure during that hospitalization varied from 120/80 to 170/120 with an average of 160/110 mm Hg. Glucose tolerance tests, liver function tests, excretory urogram, and electrocardiogram at that time were within normal limits. The following year the patient was again hospitalized. Blood pressure was recorded as high as 180/140 mm Hg. Occasional traces of albuminuria were noted, and 24-hour 17-ketosteroid excretion varied from 27.2 to 48.4 mg per 100 ml. Excretory urograms were again found to be within normal limits.

On admission to this hospital, blood pressure was 170/126 mm Hg. The face was moon-shaped, and slight exophthalmos was present along with moderately severe acneform skin rash over the face, back, and chest. There were many ecchymotic areas on both lower extremities, and prominent purple striae were noted over both hips. The patient's weight was 178 pounds and had been maintained at this level by rather rigorous dieting, his previous weight having been 207 pounds.

A white blood cell count was 24,300 μl with 80 per cent polymorphonucleocytes. Four-hour Thorne test revealed a drop in total eosinophil count from 150 to 0 after administration of adrenocorticotropic hormone. Urinary 17-ketosteroids were 42.6; 11-oxycorticoids, 4.46; and 17-hydroxycorticoids, 17.6 mg per 100 ml per 24 hours. After a three-day course of 20 units of corticotropin (ACTH) intravenously daily, the urinary 17-ketosteroids rose to 68 mg per 100 ml per 24 hours; 11-oxycorticoids were 5.5; and 17-hydroxycorticoids were 3 mg per 100 ml per 24 hours (fig. 1). Fasting blood sugar

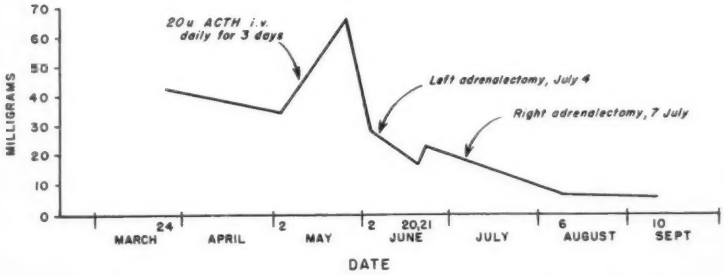

Figure 1. Twenty-four-hour urinary 17-ketosteroid excretion.

was 130 mg and two-hour postprandial blood sugar was 200 mg per 100 ml. Roentgenograms of the skull and cervical, thoracic, and lumbar spine were reported normal. An excretory urogram with retroperitoneal air insufflation revealed some displacement downward of the left kidney by a mass in the adrenal area.

A diagnosis of Cushing's syndrome due probably to adrenal cortical hyperplasia was made, and on 4 June a total left adrenalectomy was performed. The gland was about one and one-half times normal size and histologic examination revealed adrenal cortical hyperplasia. The immediate postoperative course was very gratifying in that the patient's acne began to clear, the purplish striae began to disappear, and he began to lose weight. Urinary 17-ketosteroids dropped to 22.5 mg per 100 ml per 24 hours and the blood pressure gradually approached normal. After about two weeks, however, improvement ceased and the patient noted return of the acne, rise of blood pressure, and recoloration of the striae. On 7 July 1954, the right adrenal gland was totally removed, and this gland was found to be hyperplastic. Since that time his course has been entirely satisfactory. His weight is stable at between 160-164 pounds; the preoperative leg and ankle edema, striae, and acne have entirely subsided; and the blood pressure averages about 150/95 mm Hg (fig. 2). The dusky red color of his face cleared and the moon-face appearance disappeared entirely. Maintenance therapy consists of 25 mg of cortisone daily.

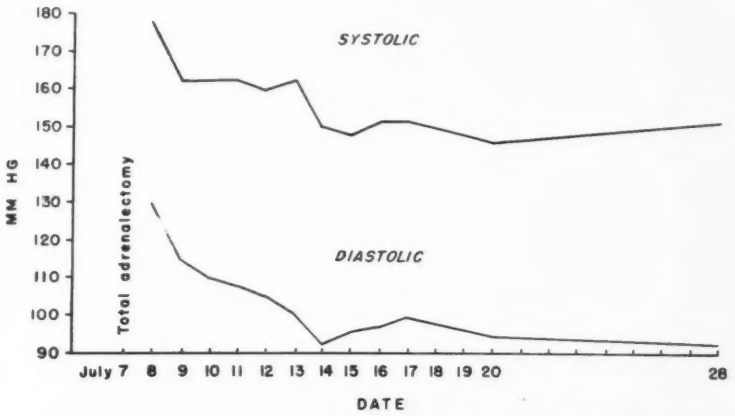

Figure 2. Blood pressure response following total adrenalectomy.

DISCUSSION

Except for osteoporosis, this patient exhibited all the manifestations of Cushing's syndrome. Retroperitoneal air studies revealed only an enlarged left adrenal gland, even though the right and left adrenals were the same size. In an attempt to distinguish between neoplasm and hyperplasia, an ACTH test was performed (table 1).

It was thought that if adrenal neoplasm were present, the administration of ACTH would not significantly alter the total 24-hour urinary excretion of 17-ketosteroids and 11-oxysteroids because such a neoplasm functions independently of anterior pituitary control; whereas if hyperplasia were present, administration of ACTH would stimulate even more steroid production by the adrenal cortex. In this patient, ACTH administration produced an increase of 17-ketosteroids and 11-oxysteroids, suggesting the presence of adrenal hyperplasia. Jailer, Gold, and Wallace[3] recently evaluated a cortisone test for differentiation between adrenal hyperplasia and adrenal cortex neoplasia. Essentially the same principle is involved. The administration of cortisone inhibits adrenocorticotropic hormone production. In adrenal cortical neoplasia, decrease in corticotropin produces no change in 17-ketosteroid urinary excretion, while in hyperplasia of the adrenal cortex, a decrease in 17-ketosteroid excretion occurs.

TABLE 1. *ACTH test*

Urinary steroids	Excretion in 24 hours	
	Base line levels	Levels after 3 days of 20 units ACTH intravenously
17-ketosteroids	42.6 mg	68 mg
11-oxycorticoids	4.46 mg	5.5 mg
17-hydroxycorticoids	17.6 mg	3 mg

The surgical approach to the adrenal gland may be transthoracic, transperitoneal, or extraperitoneal. We favor the extraperitoneal approach in most instances and it was used in this patient. Exploration of one adrenal gland allows rather accurate estimation of the condition of the other gland. If the exposed gland is small and hypoplastic, this is presumptive evidence that the contralateral gland contains primary cortical tumor. The finding of tumor in the first exposed gland, however, does not necessarily mean that tumor is not also present in the other gland. If the exposed gland is large and hyperplastic, the other gland is very probably also large and hyperplastic. Some authors advocate the removal of certain portions of hyperplastic glands or of all of the first explored gland and a portion of the remaining gland. The patient in these cases almost always either requires some form of maintenance therapy or is subject to recurrence of his disease. Sprague, Kvale, and Priestly[4] found that in virtually all cases the patients who did not receive maintenance therapy had recurrence of preoperative symptoms and signs. Experiences with totally adrenalectomized patients being treated for metastatic carcinoma of the breast will be reported by one of us (WFB) subsequently.[5] In view of the ease with which patients ordinarily can be man-

aged following bilateral total adrenalectomy, we believe that subtotal adrenalectomy, with the attendant risk of recurrence of disease, is inferior to total adrenalectomy for adrenal cortical hyperplasia.

Successful bilateral total adrenalectomies for Cushing's syndrome also have been reported by Sprague and associates and Abbott et al.[6]

SUMMARY

A discussion of Cushing's syndrome, its manifestations and pathologic physiology has been presented. Successful treatment of a male patient with this condition by bilateral, total adrenalectomy is reported. We believe that because the productivity of residual tissue left after operation cannot be at all accurately ascertained at the time of operation, in order to cure the disease one must remove the entire adrenal gland. We believe that adrenalectomized patients ordinarily are not difficult to manage and that total adrenalectomy with postoperative cortisone administration is no more dangerous to the patient than is almost total adrenalectomy with cortisone management.

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In every illness there are periods when what the patient needs most is to be left in peace—not to be stirred up, even by sympathetic interest. And there are other periods when any help is desirable even if it means facing fairly severe strain or accepting pain. The general practitioner has to decide what the patient's requirements really are. He has to decide at his own peril and at that of his patient. For his solution of the problem of "when to start" has important consequences for the further development of the illness.

—MICHAEL BALINT, M. D.
in *Lancet*
p. 683, Apr. 2, 1955

Congenital Toxoplasmosis

HOWARD A. PEARSON, *Lieutenant (junior grade) (MC) USN*

TOXOPLASMOSIS in human beings is a comparatively recently described entity. The genus *Toxoplasma* was established in 1909 by Nicolle and Manceaux[1] to include a microorganism which they discovered in the gondi, a North African rodent *(Ctenodactylus gondi)*. Appropriately, they called their find, *Toxoplasma gondii*. The genus has only this one species including a number of parasites of warm-blooded animals throughout the world. The precise nature of the parasite is still controversial; however, by general agreement, it is included among the protozoa. Toxoplasma is an obligate parasite which lives in the tissue fluids and cells of the host. Only the erythrocyte is apparently not infected. Multiplication is by binary fission. The means of transmission of the parasite is uncertain. It is believed that rodents and birds constitute the reservoir; but as yet no vector has been identified.

The first confirmable report of human toxoplasmosis was written by Jankû[2] in 1923 who described the ocular changes of chorioretinitis, and who demonstrated the parasite in the eye. In 1942 Paige, Cowen, and Wolf[3] proved prenatal infection by demonstrating the findings of disseminated toxoplasmosis in a hydrocephalic infant who was delivered after craniotomy. Recently, typical parasites have been demonstrated in the placenta of an infected infant.[4] The disease usually produces no symptoms in the mother. It has been shown consistently that mothers who produce affected children have high titers of complement-fixing and dye antibodies. The disease is more serious in younger patients; indeed the effect on the fetus is devastating. Congenital toxoplasmosis, though a rare disease, should be included in the differential diagnosis of certain frequently encountered signs and symptoms in pediatric practice. These are mental retardation, convulsions, blindness, hydrocephaly, or microcephaly.

CASE REPORT

A nine-month-old infant was referred to this hospital for evaluation of blindness and retardation. She was the second child of a white mother and a Filipino father. The mother had a normal four-year-old son, and had had a three-month spontaneous abortion prior to the birth of the patient. The mother had always lived in the Washington area; how-

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ever, the father made several trips to the Caribbean area prior to and during the patient's gestation. Pregnancy was uneventful except for a few weeks during the second trimester. At this time, the mother had rather severe muscle aches and cramps and general malaise. She did not consult a physician about this, and the symptoms regressed spontaneously.

The child was born at term; birth weight was 4 pounds 13 1/2 ounces. The child was a moderate feeding problem, and several changes of formula were made. However, after a few weeks her general appearance, feeding, and weight gain were satisfactory. She was thought to be a normal child except that she was slightly "jumpy" and her stools were slightly increased in number. Blood counts and urinalyses in the nursery were normal.

Despite normal feeding and weight gain, it soon became apparent that the child was not developing normally. Virtually no progress was made in the motor sphere. At nine months she could not support her head steadily, sit, or turn over. Her eyes had never focused, and her parents had discovered her to be blind.

Physical examination revealed a chubby, placid female infant. Her weight was 21 3/4 pounds (75th percentile); she was 27 inches in length (30th percentile); her head circumference was 16 1/2 inches (less than 3d percentile). The anterior fontanelle was open and of normal size and turgor, and the sutures were not separated.

The eyes showed bilateral wandering motions, but not true nystagmus. The eyes did not move synchronously. There was a bilateral red reflex. The pupils were round but did not respond to light. The child did not blink when light or moving objects were directed at her eyes. She was thought to be totally blind. Funduscopically the vessels were normal and most of the retina was of normal color and pigmentation. The optic disks were dead white in color, showing typical optic atrophy. In the macular region bilaterally were punched-out areas, white in color, about one third the size of the disks. These lesions showed punctate pigment deposits.

Hearing was grossly intact. No teeth had erupted. The heart and lungs were normal. The liver edge was palpable three centimeters below the costal margin in the midclavicular line. No other organs or masses were palpated.

The child moved all extremities, and would withdraw these when stimulated. The deep tendon and abdominal reflexes were normal. There were bilateral extensor plantar reflexes. There was moderate rigidity of the lower extremity flexors. When the child was disturbed, she had clonic movements of the left arm and leg.

Complete blood cell count, serologic test for syphilis, and Vollmer tuberculin patch test were normal. Lumbar puncture demonstrated clear fluid under no increased pressure. This fluid contained 7 red blood

cells, 4 neutrophils, and 1 lymphocyte per μl. The sugar was 61; chlorides, 738; and protein, 60 mg per 100 ml.

Electrocardiographic findings were within normal limits for the age of the patient. The electroencephalogram showed generalized abnormality, with maximum slow activity over the left frontal and temporal regions. Roentgenograms of the skull showed extensive intracranial calcifications (figs. 1 and 2).

Roentgenograms of the extremities showed normal ossification centers for the child's age. No soft tissue calcification was noted.

Ventricular aspiration demonstrated clear fluid with 1 red blood cell, 2 neutrophils, and 1 lymphocyte per μl. The protein was 37. 2 and the sugar was 44 mg per 100 ml. No organisms were demonstrated in the ventricular fluid.

Ventriculograms showed massive, symmetrical dilatation of the lateral and third ventricle with a block, probably in the region of the aqueduct of Sylvius (figs. 3 and 4).

The hospital course was uneventful, and the patient tolerated the various procedures well. It was believed that the patient's disease was inactive and that no medical therapy or chemotherapy was indicated. A neurosurgical consultant advised no surgical intervention for the hydrocephalus. Since discharge the patient's condition has not changed, and arrangements are being made for institutionalization.

DISCUSSION

The classical features of the syndrome of congenital toxoplasmosis, namely, chorioretinitis, internal hydrocephalus, and intracranial calcifications, have been reported in many cases. The eyes and central nervous system appear extremely susceptible to the effects of the parasite. However, a parasitemia occurs during the disease, and in autopsy specimens the parasite has been demonstrated in the heart, muscles, and other viscera as well as the brain and eye.[5]

PATHOGENESIS OF OCULAR LESIONS

The parasite is blood-borne to the eye, where granulomatous reaction and necrosis occurs. The early lesion is a localized area of retinal edema with a central umbilicated ulceration. As the edema regresses, the destruction of the choroid and retina becomes apparent and the underlying sclera shows through the destroyed layers of the choroid and the retina. Irregular pigmentation, heavier at the periphery, is then seen. The lesions tend to be bilateral and symmetrical; the macular areas are very frequently involved. The media is clear. Optic atrophy of the secondary type is often seen as a result of the increased intracranial pressure of the internal hydrocephalus. Depending on the degree

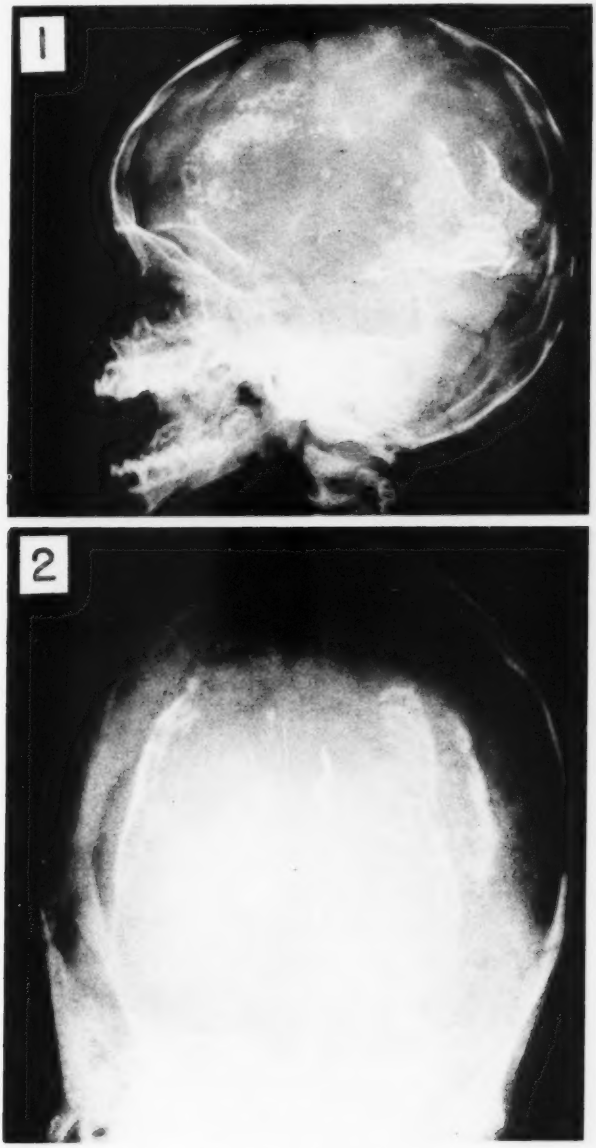

Figure 1. Lateral view of the skull showing extensive calcifications, the shape of which suggests that of dilated lateral ventricles. Figure 2. Posteroanterior view of the skull showing linear distribution of the calcifications. Symmetrical calcifications in the area of the basal ganglia and a large, thrombosed vessel are also noted.

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Figure 3. Ventriculogram demonstrating massive internal hydrocephalus with dilatation of the lateral and third ventricles. Figure 4. Posteroanterior projection showing typical periventricular distribution of calcifications.

of retinal involvement, for the lesions of chorioretinitis can be extensive, and depending upon whether optic atrophy is present, the child may have some useful vision or be totally blind. Because of the frequent macular involvement, central vision is poor.

PATHOGENESIS OF THE INTERNAL HYDROCEPHALUS

During the parasitemia, the organism enters and destroys many of the ependymal cells lining the ventricles. In the relatively large lateral and third ventricles, this causes only loss of continuity of the ependymal layer. However, in the narrow confines of the aqueduct of Sylvius, the inflammation, edema, and tissue necrosis often cause obstruction of the cerebrospinal fluid flow. Closure of the foramina of the fourth ventricle also is seen. This obstruction causes the internal hydrocephalus.

PATHOGENESIS OF INTRACRANIAL CALCIFICATIONS

The intracranial calcifications of congenital toxoplasmosis are characteristically periventricular and diffuse. The cause of this distribution is speculative; however, Frenkel and Friedländer[6] suggested an interesting theory: The ventricular fluid in these patients has repeatedly been shown to be a potent source of toxoplasma antigen and often contains organisms. The ependyma, where intact, is impermeable to the cerebrospinal fluid. However, where ependymal destruction has occurred, fluid may seep into the surrounding brain tissue, facilitated by the increased intracranial pressure. As the antigen-rich fluid permeates the tissue, it encounters extracellular fluid. Because the antibody mechanism of the host has been stimulated, the blood and extracellular fluid contain free toxoplasma antibody. When the antigen-antibody combination takes place in the periventricular tissue, further inflammation and tissue necrosis occur. After the inflammation subsides, repair and calcification occur. Perivascular hemorrhage, vascular thrombosis, and infarction may also develop in the area.

SUMMARY

A case illustrating the classical findings of congenital toxoplasmosis is presented. Chorioretinitis, internal hydrocephalus, and intracranial calcifications which are characteristic of this syndrome were present. It is suggested that congenital toxoplasmosis be included in the differential diagnosis when mental retardation, convulsions, blindness, hydrocephaly, or microcephaly are encountered. Funduscopic examination for chorioretinitis and roentgenographic examination of the skull for intracranial calcifications offer the most satisfactory means of establishing the diagnosis.

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WHAT IS A G. P.?

"The first step . . . is to decide who is a general practitioner. This is not as easy as it appears. So wide is the field of general practice that to say a man is a general practitioner is not much more informative than to say that he is a surgeon. After much deliberation the [Canadian] College of General Practice arrived at the negative definition that 'he is a doctor who does not limit his practice to any one field of medicine.' A popular identification—flippant but descriptive—is: 'A general practitioner is an internist who does as much surgery as the hospital facilities, and his colleagues, will permit.'"

—H. G. HALL, M. D.
in *Canadian Medical Association Journal*
p. 90, July 15, 1955

Cortisone in Treatment of Acute Pancreatitis Associated With Mumps Epidemic Parotitis

AUGUSTUS F. BLOODWORTH, *Captain, USAF (MC)*
STANLEY L. COHEN, *First Lieutenant, USAF (MC)*

PANCREATITIS associated with mumps (epidemic parotitis) is a recognized medical entity occurring frequently enough that early recognition and treatment is important in a serious and possibly fatal disease complication. The diagnosis is suggested by the appearance of epigastric pain, nausea, and vomiting, with associated tenderness on deep palpation. The most striking diagnostic laboratory finding is an elevation of the serum amylase.

The use of adrenal corticosteroids has been favorably reported in treatment of acute hemorrhagic pancreatitis.[1,2] The following is a report of a case of acute pancreatitis, associated with mumps, in which the use of cortisone was felt to be lifesaving.

CASE REPORT

A 17-year-old airman was admitted to the medical service of this hospital on 18 April 1955, with a chief complaint of pain in the right parotid area with associated discomfort on swallowing for 1 day prior to admission.

The patient had had "mumps" on the left side at the age of 6. Physical examination on admission revealed a moderately ill white man who had definite swelling and tenderness over his right parotid gland and associated inflammatory changes around the orifice of Wharton's duct on the right. His temperature was 99.8° F. There were no other positive physical findings.

A diagnosis of mumps was made, and the patient was placed on strict bed rest, 5 mg. of diethylstilbestrol daily, sedation, and analgesics. Temperature elevations to 99.8° F. occurred daily during the first 3 hospital days. On the fourth day the patient developed a bilateral epididymitis, manifested by pain and tenderness over both epididymal areas, with associated temperature of 101.6° F. This was managed with ice bags to the involved area, and opiates for pain. Although the symp-

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toms improved on the fifth day, the patient's temperature was elevated to 103° F., and that evening this was accompanied by a vague pain in the upper abdomen. On the sixth day, abdominal pain was more severe and radiated through to the back. Examination revealed definite tenderness over the entire upper abdomen. The patient's temperature was 104° F. Nausea, vomiting, and flatulence ensued. Serum amylase was 80 Somogyi units (normal 20-40). A diagnosis of pancreatitis was evident. Treatment, consisting of gastric suction, intravenous feedings, and small doses of regular insulin, anticholinergics, and opiates, was instituted. Penicillin and streptomycin were administered parenterally. The patient seemed to be improving symptomatically, although his temperature remained elevated.

Late during the sixth hospital day the patient became very weak and appeared to be in shock. His rectal temperature was 105.6° F. and tachycardia (pulse 130) was present. Following this, the patient became stuporous and was placed on the dangerously ill list. His blood cell count revealed a leukocytosis with a shift toward immature forms. Blood cultures, liver function studies, serum electrolytes and blood glucose revealed no significant abnormalities.

Cool water enemas and spongings with alcohol were given without any significant temperature change. One hundred milligrams of cortisone was given intramuscularly, and followed with 50 mg. every 6 hours. By the morning of the seventh hospital day there was dramatic improvement. The patient was rational, feeling stronger, and his temperature was declining.

Later in the day the patient developed diffuse bronchospasm which responded to sedation, bronchodilators, and alevaire (brand of a detergent superinone) inhalations. His temperature became normal on the eighth hospital day. Cortisone was continued at a dosage of 50 mg. intramuscularly, every 8 hours, for 3 more days. Repeat serum amylase determination was 30 Somogyi units By the twelfth hospital day the patient was ambulatory and feeling well, except for slight epididymal pain. On the eighteenth hospital day the patient was discharged on convalescent leave.

DISCUSSION

The serum amylase of most patients with epidemic parotitis is elevated during the first few days of illness. This is believed to be associated with the acute inflammatory process in the parotid glands rather than with an accompanying pancreatitis.[3] However, a serum amylase of twice normal value is pathognomonic of acute pancreatitis in the presence of signs and symptoms such as those seen in our patient. Although an anticholinergic drug, banthine (brand of methantheline bromide), and gastric suction afforded temporary relief, cortisone reverted a downhill course to one of recovery.

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THE DOCTOR'S SKIN

The problem of industrial dermatoses is a major one, but no working man is exposed to more irritating or potentially sensitizing substances than the physician. It is not surprising that each year surgeons or obstetricians must find other fields of medicine into which to enter because their hands cannot tolerate the necessary scrubbing. Some promising trainees for private medical practice must direct their future planning toward administrative positions for the same reason. Much of this could be avoided if proper care is taken of the skin. . . . The doctor is prone to treat himself with all sorts of self-medication, which may be injudicious and sometimes actually harmful. Treat your skin kindly as you are going to need it for a long time.

—FRANK G. WITHERSPOON, M. D.
in *Journal of the Tennessee State Medical Association,* pp. 400 and 403, Oct. 1954

MEDICAL WISDOM

All the power of tongue and pen, and all the wisdom of textbook and lecture, can never teach a doctor the knowledge of when to probe and when to leave alone, when to chide and when to reassure, when to speak and when to keep silent. They are private mysteries with a different solution for every one of the million permutations of personality involved between a doctor and his patient.

—RICHARD ASHER, M. D.
in *Lancet*
p. 758, Apr. 9, 1955

A MESSAGE FROM THE A. M. A.

The January issue of the *U. S. Armed Forces Medical Journal* carried the first in a series of articles to acquaint physicians in uniform with the organization, function, history, and purpose of the American Medical Association. Last month a brief history and the purpose of the Association were covered, as well as the membership requirements and types of membership.

The policy-making body of the Association is the House of Delegates which meets in June and December of each year. The Board of Trustees directs all activities of the Association between these meetings. The Secretary-General Manager supervises all activities of the councils, bureaus, and committees between meetings of the Board.

Thirteen standing committees serve the House of Delegates and Board of Trustees. Four councils report directly to the House of Delegates, and seven councils and two committees report to the Board of Trustees. Councils and committees are composed of from 5 to 18 physicians. Members are either elected by the House of Delegates or appointed by the Board of Trustees. Councils and committees decide policies on all activities under their jurisdiction, subject to approval by the Board of Trustees and the House of Delegates. Most councils and committees have a full-time staff at A. M. A. headquarters which implements their programs. Each staff is headed by a secretary. Those committees without a full-time staff are serviced by the office of the Secretary-General Manager.

One of the standing committees of the Board of Trustees is the Council on National Defense. This Council is a direct outgrowth of a special committee appointed by the House of Delegates in December 1945 to study the experiences of medical officers during World War II with special reference to opportunities for study, research, actual treatment of the sick, rotation of medical assignments, and use of medical officers for nonmedical duties.

The responsibilities of the Council on National Defense generally fall into two areas—military medical affairs and civil defense matters as they relate to medical preparedness. Because of the increased scope of activities in these two areas within the

From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense. —*Editor.*

past few years, two committees of the Council were established —the Committee on Military Medical Affairs and the Committee on Civil Defense.

The Council assists the Armed Forces, as well as state and federal civil defense authorities, with medical and health problems and acts as a liaison with allied health agencies regarding personnel, facilities, and material needed in time of national emergency. It assists in planning for the distribution of medical and allied personnel in an all-out emergency, aids with national and state disaster relief plans, and co-ordinates the work of the state emergency medical service committees.

In the field of military medical affairs, the Council and its Committee work closely with the Surgeons General of the armed services and the Assistant Secretary of Defense (Health and Medical) in formulating plans and procedures designed to improve medical care for members of the Armed Forces. In this way, they also assist in ensuring the most advantageous use of the country's medical manpower. For several years the Council has conducted a continuing survey among physicians being released from active military service. The survey is designed to obtain information on the utilization of physicians and medical staffing conditions in the Armed Forces and to solicit comments and suggestions concerning the improvement of the military medical corps. Reports, covering a six month's summary, are published in the *Journal of the American Medical Association,* and copies are furnished to military representatives. These reports have served as a guide for discussions with the military departments.

Another activity of the Council and its Committee on Military Medical Affairs is a placement service to furnish assistance to physicians being released from active military service by providing information pertaining to available civilian medical opportunities. This program has been well received and the Council has furnished placement assistance to over 2,000 physicians. The Council also assists State Volunteer Medical Advisory Committees to the Selective Service System in replacing deferred physicians who have a military obligation. The Council also closely follows federal legislative proposals which, if enacted, would affect military medical activities.

The Council attempts to ensure a proper balance between the medical needs of the civilian population and the Armed Forces, by working closely with the National Health Resources Advisory Committee, the National Advisory Committee to the Selective Service System, and state advisory committees to Selective Service.

The Council firmly believes that the development of a strong and attractive medical service of the Armed Forces and federal agencies is in the best interest of the public welfare, and that the development of such services depends on the confidence and intimate collaboration of the medical profession of this nation.

Next month, civil defense activities of the Council on National Defense and other operations of the American Medical Association will be discussed.

DEATHS

CUNOV, Harvey Frank, Major, MSC, USAR, San Antonio, Tex.; 3d Army Area Medical Laboratory, Fort McPherson, Ga.; graduated in 1929 from the Michigan State College, East Lansing, Mich.; commissioned a First Lieutenant 17 February 1943; ordered to active duty 4 March 1943; died 23 November 1955, age 51, of myocardial infarction.

DE FOREST, Julia Ann, Lieutenant (jg) (NC) USNR, Douglas, Wyo.; U. S. Naval Station, Kodiak, Alaska; graduated in 1951 from the St. Mary's School of Nursing, Rochester, Minn.; appointed an Ensign 17 March 1953; ordered to active duty 1 May 1953; died 2 December 1955, age 25, in Kodiak, Alaska.

FRANK, Elliot Herman, Major, DC, USAR, Wantagh, Long Island, N. Y.; 2104th Service Unit, Camp A. P. Hill, Va.; graduated in 1941 from the University of Indiana School of Dentistry, Indianapolis, Ind.; commissioned a Major 28 February 1955; ordered to active duty 9 May 1955; died 5 September 1955, age 42, in Fredericksburg, Va., of coronary thrombosis.

FRAZEE, Edward Blackwell, Lieutenant Colonel, MSC, USA, Sioux Falls, S. D.; Landstuhl Army Medical Center, Germany; graduated in 1935 from the Lehigh University College of Chemistry, Bethlehem, Pa.; commissioned a Second Lieutenant 27 September 1941; died 23 October 1955, age 43, in Germany, of injuries received in an automobile accident.

GRANT, Seymour, Captain, MC, USAR, Sepulveda, Calif.; Ryukyus Army Hospital, Okinawa; graduated in 1950 from the University of Michigan Medical School, Ann Arbor, Mich.; commissioned a First Lieutenant and ordered to active duty 25 August 1953; died 24 November 1955, age 31, in Okinawa.

ORMAND, Margaret Louise, Major, ANC, USA, Richmond, Va.; William Beaumont Army Hospital, Fort Bliss, Tex.; graduated in 1934 from the Petersburg Hospital School of Nursing, Petersburg, Va.; commissioned a Second Lieutenant 2 February 1941; died 13 November 1955, age 42, at the Deming Ladies Hospital, Deming, N. Mex., of injuries received in an automobile accident.

THE MEDICAL OFFICER WRITES

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McKay, D. G., Capt., MC, USA; Hardaway, R. M., III, Lt. Col., MC, USA; Wahle, G. H., Jr., 1st Lt., MC, USA; and Hall, R. M., Capt., MC, USA: Experimental pseudomembranous enterocolitis; production of means of thrombosis of intestinal mucosal capillaries. *A. M. A. Arch. Int. Med.* 95: 779-787, June 1955.

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Promotions of Officers

The following officers of the military medical services on active duty in the Army, Navy, and Air Force have recently received temporary promotions to the rank indicated:

MEDICAL CORPS

ABELL, Thomas G., Lt., USN
AMSDEN, Neal F., Lt., USN
ANDERSON, Lewis D., Lt., USN
ARRONAFIGUEROA, Joseph A., Lt., USN
ASHWORTH, Charles R., Lt., USN
BAKER, Larry D., Lt., USN
BARRICK, Richard H., Lt., USN
BAUER, Clifford T., Lt., USN
BECKER, Bruce A., Lt., USN
BELL, George R., Lt., USN
BENNETT, Wayne E., Lt., USN
BERMAN, Irwin, Lt., USN
BLONER, Emanuel M., Lt., USN
BLUM, Harold F., Lt., USN
BONNEY, James H., Lt., USN
BOWLIN, Paul F., Lt., USN
BRANDT, Henry E., Lt., USN
BRIDGE, Robert E., Lt., USN
BRINK, Paul E., Lt., USN
BRODIE, Sheldon J., Lt., USN
BROWN, Dudley E., Jr., Lt., USN
BROWN, Jacob V., Lt., USN
BROWN, Philip W., Jr., Lt., USN
BURKE, Albert V., Lt., USN
BURKE, Robert A., Lt., USN
BURRIS, Boyd L., Lt., USN
BUTLER, Milton C., Jr., Lt., USN
CANNON, Joseph N., Jr., Lt., USN
CARPENTER, Harry M., Lt., USN
CARSON, William E., Lt., USN
CASEBOLT, Donald E., Lt., USN
CAUFFMAN, William J., Lt., USN
CICALESE, Gerard T., Lt., USN
COLE, Buell C., Lt., USN
COLLINS, James E., Lt., USN
CORSO, Philip F., Lt., USN
CORSON, Hampton P., Lt., USN
COX, James L. D., Lt., USN
CROCK, Angus M. G., Lt., USN
DALRYMPLE, Richard E., Lt., USN
DARDIS, Alfred R., Lt., USN
DAVIS, Richard G., Lt., USN
DEARANI, Abraham C., Lt., USN
DOOLEY, Thomas A., III., Lt., USN
DRAHEIM, Jerry W., Lt., USN
DUDLEY, Hugh R., Lt., USN
DULANEY, Charles H., Lt., USN
DUNLAP, James A., Jr., Lt., USN
DUNN, Thomas S., Jr., Lt., USN
EAGAN, John T., Lt., USN
EASTERDAY, Robert H., Lt., USN
EDWARDS, Ernest G., Lt., USN
EFRON, Robert, Lt., USN
ELAM, William N., Jr., Lt., USN
FABRICIUS, Richard N., Lt., USN
FEIGELMAN, Howard F., Lt., USN
FITCHETT, Vernon H., Lt., USN
FLANAGAN, William L., Lt., USN
FLETCHER, William P., Lt., USN
FORTENBERRY, Jerry A., Lt., USN
FOSTER, Donald J., Lt., USN
FREEMAN, William T., Lt., USN
FRIEDBERG, Samuel J., Lt., USN
FRY, William J., Lt., USN
GARRISON, Joseph S., III., Lt., USN
GERBER, Edward, Lt., USN
GETZEN, Lindsay C., Lt., USN
GOLDHIRSCH, Henry, Lt., USN
GOOD, Daniel C., Lt., USN
GORDON, Robert B., Lt., USN
GRAFF, Shirley R., Lt., USN
GREEN, Leo R., Lt., USN
GROTE, Arthur J., Lt., USN
GRUBBS, Thomas A., Jr., Lt., USN
GUDERIAN, Arnold M., Lt., USN
GUSSACK, Harold A., Lt., USN
GUSSLER, Charles G., Lt., USN
GUTHRIE, Andrew D., Jr., Lt., USN
HALL, Louis A., Lt., USN
HALL, William M., Lt., USN
HARRIS, James G., Lt., USN
HARTMAN, John M., Lt., USN
HEATON, Elton, Jr., Lt., USN
HEMNESS, Edwin M., Lt., USN
HENSOLD, William F., Lt., USN
HERRING, William B., Lt., USN
HICKS, Jesse R., Lt., USN
HINTON, Benjamin F., Lt., USN
HOFMANN, Walter D., Lt., USN
HOOVER, Robert T., Lt., USN
HORNER, Robert L., Lt., USN
HURLEY, Lloyd A., Lt., USN
IRONS, Raymond J., Lt., USN
JOHNSON, Louis L., Lt., USN
JUDGE, Walter F., Lt., USN
KELLEHER, Robert E., Lt., USN
KEMP, Verbon E., Jr., Lt., USN
KEYES, George W., Lt., USN
KING, Lawrence M., Jr., Lt., USN
KING, Philip J., Lt., USN
KINGSOLVER, Wendel R., Lt., USN
KLEH, Thomas R., Lt., USN
LABITZKE, Hermann G., Lt., USN
LAVELL, Thomas E., Jr., Lt., USN
LEFER, Leon, Lt., USN
LEVY, Marshall S., Lt., USN
LEWIS, Lawrence J., Lt., USN
LIEBENDORFER, Richard A., Lt., USN
LIVINGOOD, John K., Lt., USN
LOCKE, Francis A., Lt., USN
LONG, Henry H., Lt., USN
MAMMEL, Clayton K., Lt., USN
MARTIN, Sidney A., Lt., USN
MATTSON, Daniel H., Lt., USN
MAYBERRY, William E., Lt., USN
MAYLE, Francis C., Jr., Lt., USN
McHENRY, Laudie E., Jr., Lt., USN
McLEAN, George E., Lt., USN
McMAHAN, Robert O., Lt., USN
McNEELY, Irwin H., Lt., USN
MENDELSOHN, Ronald E., Lt., USN
METCALF, John W., Jr., Lt., USN
MISHKIN, Mark M., Lt., USN
MOERSCH, Richard N., Lt., USN
MOYA, Frank, Lt., USN
MYERS, James D., Lt., USN
NELLERMOE, Carrol W., Lt., USN
NELSON, Raymond M., Lt., USN

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NEMEROVSKI, Sheldo A., Lt., USN
NIRSCHL, Boyd F., Lt., USN
NOWELL, Peter C., Lt., USN
NUNNERY, Arthur W., Lt., USN
OCONNELL, Fred H., Lt., USN
OSTLUND, Philip D., Lt., USN
OTTUM, John A., Lt., USN
OWSLEY, John O., Jr., Lt., USN
PAWLOWSKI, Joseph M., Lt., USN
PENNISI, Joseph A., Lt., USN
POMPONIO, Joseph G., Lt., USN
POSTLE, Jack R., Lt., USN
QUICKERT, Marvin H., Lt., USN
RAFFENSPERGER, John G., Lt., USN
REISER, Albert I., Lt., USN
RESTOSOTO, Andres D., Lt., USN
REYNOLDS, Arthur M., Jr., Lt., USN
RICHARDS, John B., Lt., USN
RICHARDSON, Joseph H., Lt., USN
RING, John J., Lt., USN
RIPPLE, Rudolph J., Jr., Lt., USN
RITTENBURY, Max S., Lt., USN
ROBERTS, Arthur R., Lt., USN
ROSSWAY, Warren H., Lt., USN
ROYCE, Paul C., Lt., USN
RUNDLE, Frank L., Lt., USN
RUSSELL, John M., Jr., Lt., USN
SACRINTY, Nicholas W., Lt., USN
SAGER, Stanley M., Lt., USN
SAVILLE, John W., Lt., USN
SCHOEFFEL, Michael E., Lt., USN
SEARS, Peter D., Lt., USN
SHEFFEL, Donald J., Sr., Lt., USN
SHUTT, John P., Lt., USN
SIMMONS, Ernest C., Lt., USN
SINGLETON, Samuel W., Lt., USN
SLAGER, Richard F., Lt., USN
SLATER, John B., Lt., USN
SMITH, Jack G., Lt., USN
SMITH, James W., Lt., USN
SOLBERG, Lincoln E., Lt., USN
STAGGERS, Frank E., Lt., USN
STEELE, Jack T., Lt., USN
STELLER, Robert E., Lt., USN
STEVENSON, Andrew W., Jr., Lt., USN
STOHLMAN, John W., III., Lt., USN
STRICKLER, James C., Lt., USN
TAYLOR, Robert D., Lt., USN
TEYNOR, Joseph W., Lt., USN
THOMPSON, Joseph M., Lt., USN
TOBIN, Arnold D., Lt., USN
TORSNEY, Jerome M., Lt., USN
WARE, Robert E., Lt., USN
WEIS, Donald R., Lt., USN
WESTPHAL, Benjamin H., Lt., USN
WHITE, Bradford C., Lt., USN
WHITE, Jack C., Lt., USN
WILKIE, Ormond L., Lt., USN
WILLIS, Harlan L., Lt., USN
WURZEL, John F., Lt., USN

DENTAL CORPS

AARONIAN, James B., Lt., USN
ALLAN, Lamont D., Lt., USN
ANDERSON, Gordon D., Lt., USN
ANDREWS, Jack W., Lt., USN
ANTONIESKI, Eugene P., Lt., USN
BACON, Stanley H., Lt., USN
BARBER, Herbert, Lt., USN
BECKMANN, William J., Lt., USN
BENTON, Robert H., Lt., USN
BJERKEN, Maurice R., Lt., USN
BLAGBROUGH, Richard W., Lt., USN
BOLINE, Charles A., Lt., USN
BRADLEY, Daniel M., Jr., Lt., USN
BROFSKY, Herbert B., Lt., USN
BROKAW, Rodman, Lt., USN
BRYAN, William J., Lt., USN
BUCKLEY, Arthur B., Lt., USN
BURKHARD, Robert W., Lt., USN
BURNS, Kurt D., Lt., USN
CARUSILLO, Louis J., Jr., Lt., USN
CHAIN, Robert R., Lt., USN
CHOISSER, Frederick G., Lt., USN
CHRISTENSON, Robert E., Lt., USN
CHRISTIE, Robert W., Jr., Lt., USN
CLIPPINGER, Richard V., Lt., USN
CODY, Donald J., Lt., USN
CORNISH, Robert L., Lt., USN
COWEN, Charles E., Jr., Lt., USN
COX, Robert M., Jr., Lt., USN
CURLEY, Philip W., Lt., USN
DAMIANO, Maurice A., Lt., USN
DAVIS, Thomas G., Lt., USN
DAY, Lawrence D., Lt., USN
DEJULIEN, Lorence F., Jr., Lt., USN
DEUTSCH, Thomas J., Lt., USN
DEVINE, Robert K., Lt., USN
DILLARD, Clarence E., Jr., Lt., USN
DODELSON, Donald J., Lt., USN
DRAKE, Daniel H., Lt., USN
DRECHSEL, Lewis W., Lt., USN
DUCA, Lawrence P., Lt., USN
DVOROVY, Eugene S., Lt., USN
FIELDS, Ellis S., Lt., USN
FINK, Herbert A., Lt., USN
FIOCCHI, Raymond M., Lt., USN
FLETCHER, Lelland M., Lt., USN
FOOTE, George B., Col., USA
FOSTER, Glen E., Jr., Lt., USN
FREEBURN, Harold E., Jr., Lt., USN
FREED, Sidney, Lt., USN
FRITSCHE, James, Lt., USN
GABRIEL, Thomas W., Lt., USN
GARMAN, Thomas A., Lt., USN
GATES, Richard H., Lt., USN
GERVASON, Richard E., Lt., USN
GLASMAN, Milton S., Lt., USN
GOLAN, Theodore P., Lt., USN
GOLDSTON, Stanley, Lt., USN
GORDON, Jerome, Lt., USN
GOULD, John C., Jr., Lt., USN
GRAY, Paul L., Lt., USN
GREGORY, William A., Lt., USN
GROVER, Alan J., Lt., USN
HAESELER, George A., Capt., USA
HARTLAND, Thomas J., Lt., USN
HARTLEY, Bruce R., Lt., USN
HAYS, James W., Lt., USN
HAZEN, Stanley P., Lt., USN
HEATH, Wayne L., Lt., USN
HICKEY, David G., Lt., USN
HILL, Jay W., Lt., USN
HILLEBRAND, Paul J., Lt., USN
HOIEN, Ralph D., Lt., USN
HOLTER, Paul W., Col., USA
HYDE, Philip L., Lt., USN
HYLTON, Roscoe P., Jr., Lt., USN
IRBY, William B., Col., USA
JACOBSON, Robert L., Lt., USN
JAFFE, Raymond P., Lt., USN
JOHNS, Onas L., Col., USA
JOHNSON, George S., Jr., Lt., USN
JOHNSON, Thomas E., Lt., USN
JOVOIS, Alexander J., Lt., USN
KAEP, Thomas J., Lt., USN

KAPLAN, Herman, Lt., USN
KELLOGG, Keith D., Lt., USN
KELLY, Joseph M., Lt., USN
KELLY, William P., Lt., USN
KESSLER, William B., Lt., USN
KWATISKY, Frank, Lt., USN
KLOEFELER, Dale D., Lt., USN
KWAIT, Donald, Lt., USN
LABRIOLA, William H., Lt., USN
LAMERMAYER, Richard N., Lt., USN
LAWTON, Edward A., Lt., USN
LEIDICH, Ray N., Lt., USN
LEISER, Fred C., Jr., Lt., USN
LEWANDOWSKI, Anthony, Lt., USN
LICHT, Richard P., Lt., USN
LIEBSTER, Louis I., Lt., USN
LINN, Scott D., Col., USA
LOMBARDI, Ludwig A., Lt., USN
LOVE, William C., Lt., USN
MAHN, Ronald E., Lt., USN
MATARAZZO, Joseph T., Lt., USN
McAULEY, Robert B., Lt., USN
McDEVITT, Edwin R., Jr., Lt., USN
McDONALD, Richard L., Lt., USN
McKEAN, Thomas W., Lt., USN
MEKA, Edward M., Lt., USN
MERCER, Victor H., Lt., USN
MICHELS, Gerald L., Lt., USN
MILLER, David L., Lt., USN
MINKER, Jules S., Lt., USN
MOLL, Robert K., Lt., USN
MOORE, Frank B., Lt., USN
MOORE, Robert L., Jr., Lt., USN
MURRAY, James N., Lt., USN
NAGELSEN, Joseph C., Jr., Lt., USN
NAGOURNEY, Frank E., Lt., USN
NASON, Jack R., Lt., USN
NEEDLE, Robert N., Lt., USN
NELSON, Donald W., Lt., USN
NIED, Walter S., Jr., Lt., USN
NOLF, Robert S., Lt., USN
NORTON, James A., Lt., USN
OLSWANG, Kay B., Lt., USN
PACE, Madison S., Lt., USN
PAINTER, Everett G., Lt., USN
PERRODIN, John A., Lt., USN
PFEIFER, John S., Lt., USN
PINTER, James E., Lt., USN
POST, Roger A., Lt., USN
POWELL, Kershaw E., Lt., USN
PRAHL, Jerome H., Lt., USN
RASHKIND, Herbert E., Lt., USN
RASOR, Richard D., Lt., USN
RATCLIFFE, James R., Lt., USN
REESE, James W., Lt., USN
REGAN, Frank G., Jr., Lt., USN
REIDER, Robert D., Lt., USN
RIGGS, Lawrence B., Jr., Lt., USN
ROMZICK, James P., Lt., USN
ROUGEUX, Lawrence J., Lt., USN
ROY, Hector H., Lt., USN
SAWUSCH, Raymond H., Lt., USN
SAWYER, Charles K., Lt., USN
SCHNEIDER, Leon E., Lt., USN
SCHOEMAKER, Darvin D., Lt., USN
SCHROEDER, Ralph C., Lt., USN
SEAMONS, Dick C., Lt., USN
SEGAL, Jerome S., Lt., USN
SEPE, George J., Lt., USN
SHEFFLER, Edgar A., Lt., USN
SHEPARD, Leon A., Lt., USN
SHREVE, William B., Jr., Lt., USN
SIMMS, William B., Col., USA
SIMPSON, Keith B., Lt., USN
SIMS, William P., Lt., USN
SMITH, Donald C., Lt., USN
SMITH, George E., Jr., Lt., USN
SMITH, James O., Lt., USN
SMITH, John P., Lt., USN
SOROKIN, Raymond L., Lt., USN
STAROSTA, Norman M., Lt., USN
STETZEL, Robert M., Lt., USN
STIER, Joseph B., Lt., USN
STOLTZ, David R., Lt., USN
STORY, Gordon H., Lt., USN
SWEET, Thomas O., Lt., USN
SWIMMER, Leonard, Lt., USN
TANNER, Thomas P., Lt., USN
TAYLOR, Albert J., Lt., USN
TAYLOR, William N., Lt., USN
TERTEL, Kenneth J., Lt., USN
TESCH, Robert, Lt., USN
THOMPSON, James C., Lt., USN
THOMPSON, Robert G., Lt., USN
TOW, Herman D., Jr., Lt., USN
TRENT, Calvert E., Lt., USN
VONBERG, Donald R., Lt., USN
WALSH, Robert L., Col., USA
WEISS, Arnold, Lt., USN
WERNER, Robert A., Lt., USN
WESTCOTT, Maurice E., Lt., USN
WISE, Harry W., Jr., Lt., USN
WOLF, Merwin, Lt., USN
WOODY, Wilton G., Lt., USN
WRIGHT, Francis H., Lt., USN
WUTHRICH, Frederick J., Lt., USN
YONALLY, James F., Lt., USN
ZAWROTNY, Raymond, Lt., USN
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ZUBER, Walter H., Jr., Lt., USN
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BIGGS, Leland M., Lt., USN
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BOGGS, Clifford W., Lt., USN
BOWE, Warren G., Lt., USN
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BRYANT, Harvey F., Lt., USN
CARR, Charles A., Jr., Lt., USN
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COURTNEY, John C., Lt., USN
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DEWITT, Richard G., Lt., USN
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LACY, Dexter J., Lt., USN
LAEDTKE, Ralph H., Lt., USN
LEACH, Thomas G., Jr., Lt., USN
LEE, Raymond W., Lt., USN
LIND, Vincent E., Lt., USN

MEDICAL SERVICE CORPS—Continued

MARSH, William G., Jr., Lt., USN
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McMAHON, Talmadge G., Lt., USN
MERRELL, Walter C., Lt., USN
MILLER, Edwin B., Lt., USN
MORGAN, William J., Jr., Lt., USN
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NICHOLSON, Earl M., Lt., USN
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SANDERS, James M., Lt., USN
SCALES, Thomas N., Jr., Lt., USN
SCHWAB, Albert J., Lt., USN
STALLBORIES, Donald G., Lt., USN
STILES, Thomas P., Lt., USN
SWINDAL, James R., Lt., USN
SYKES, Stanley E., Lt., USN
WARNER, Albert D., Lt., USN
ZALLER, Frank A., Lt., USN

NURSE CORPS

ANDERSON, June L., Lt., USN
BALL, Adele M., Maj., USAF
BEAUREGARD, Marie J., 1st Lt., USAF
BENSON, Glenda M., 1st Lt., USAF
BEVANS, Joan M., 1st Lt., USAF
BLACK, Helen J., Lt., USN
BOWER, Joan E., Lt., USN
BUCKO, Margaret R., Maj., USAF
BROWN, Flora B., 1st Lt., USA
CANTRELL, Joyce A., 1st Lt., USAF
CARPENTER, Lois T., Lt., USN
COOPER, Jacqueline L., Capt., USA
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CRAIG, Florence V., Lt., USN
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DENNIS, Catherine E., Lt., USN
DIAL, Thelma P., Lt., USN
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EBERHARDT, Marie, Lt., USN
ELDRIDGE, Ruth E., Lt., USN
ELEBY, Nettie B., 1st Lt., USAF
ELLIOTT, Laura S., Lt., USN
GREENE, Ina M., Maj., USAF
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HARRISON, Karalyn J., Maj., USA
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HENKEL, Dolores A., Lt., USN
HENNERSEY, Helen M., Maj., USAF
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HOTZINGER, Marion H., 1st Lt., USAF
JAEGER, Elizabeth L., Lt., USN
JOHNSON, Katrina O., 1st Lt., USA
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KAILAND, Addie E., Lt., USN
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LEVIN, Mildred R., Lt., USN
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MACIEJEWSKI, Marilyn A., 1st Lt., USAF
MADDEN, Winifred P., Lt. Col., USAF
MAGUIRE, Frances P., Lt., USN
MANN, Frankie L., 1st Lt., USA
MARCO, Helen, Lt., USN
MARSCH, Doris E., Lt., USN
MARTIN, Rosalie S., Lt., USN
MATTESON, Ethel L., Capt., USAF
McCOLLUM, Ernestine L., 1st Lt., USAF
MERRICK, Millicent E., Lt., USN
MICHAEL, Thedia A., Lt., USN
MOFFITT, Jeanne T., Lt., USN
MOODY, Anna E., Lt., USN
MOULTON, Gloria J., 1st Lt., USA
MUHLENFELD, Lorett T., Lt., USN
NERESON, Myrtle N., Maj., USAF
ODOM, Thelma, Lt., USN
PAGE, Mida M., 1st Lt., USA
PARENT, Pauline M., 1st Lt., USAF
PHILLIPS, Mary J., 1st Lt., USAF
PICKETT, Natalie A., Capt., USAF
PIERCE, Miriam R., Maj., USAF
PINTA, Florence F., 1st Lt., USAF
POMMIER, Angelina T., Lt., USN
PRICE, Margaret M., Maj., USAF
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RAGLAND, Wilda R., Lt., USN
READ, Anna C., Lt., USN
REESE, Mary D., Lt., USN
RILEY, Jacquelyn M., 1st Lt., USAF
ROBERTS, Lucile M., 1st Lt., USA
SARGENT, Nell E., Capt., USA
SCANLON, Mary M., Capt., USAF
SCHELCHER, Laurabel, 1st Lt., USAF
SCHIRER, Margaret L., Capt., USA
SCHLACHTER, Wilma R., Lt., USN
SCHUBERT, Phyllis V., Capt., USA
SCOTT, Berniece, Capt., USAF
SCUIGGS, Sylvia A. K., 1st Lt., USAF
SEVERSON, Shirley R., Lt., USN
SGANGA, Anna, Lt., USN
SHAFER, Mary H., Lt., USN
SHELTON, Waunie L., Lt., USN
SHERIDAN, Anne M., Lt., USN
SHERIDAN, Edythe C., Capt., USA
SHOR, Edith E., Capt., USA
SIDELL, Norma A., Capt., USA
SMITH, Donna J., Lt., USN
SNYDER, Mildred I., Lt., USN
SPROWLES, Elizabeth F., Lt., USN
STALLARD, Sally M., Capt., USA
STEPHENS, Lottie L., Capt., USA
STILWELL, Adelaide, Lt., USN
STOFA, Dorothy I., Capt., USA
STOLMACK, Rose K., Capt., USA
STRUBLE, Mary R., Lt., USN
SWANSON, Alice C., Capt., USA
TAYLOR, Virginia M., Capt., USA
THOMPSON, Carol E., Capt., USA
TORRANCE, Marion L., Capt., USA
TREGEA, Ruth E., Maj., USAF
TURNER, Clementine, Capt., USA
TURZINSKI, Dorothy C., Capt., USA
ULRICH, Marian J., Lt., USN
VALIKNAC, Ethel H., Capt., USA
VARNER, Marjorie L., Capt., USA
VOORHEES, Leah B., Capt., USA
WHEELER, Mary B., Lt., USN
WHITFIELD, Gilda G., Lt., USN
WHITFIELD, Gloria M., Lt., USN
WILLIAMS, Alice K., Lt., USN
WILLIAMS, Evelyn T., 1st Lt., USAF
WILSON, Lorna M., Capt., USA
WILSON, Ruth A., Capt., USA
WINTER, Eleanor H., Capt., USA
WOODING, Sue W., Capt., USA
WROTNOWSKI, Wanda B., Capt., USA
YARNALL, Ada M., Lt., USN
YOUMANS, Nora D., 1st Lt., USAF

BOOKS

Reviews of Recent Books

HEART DISEASE, Its Diagnosis and Treatment, by *Emanuel Goldberger*, M. D., F. A. C. P. 2d edition. 781 pages; 298 illustrations on 107 figures; 5 tables. Lea & Febiger, Philadelphia, Pa., 1955. Price $12.50.

It is the intent of the author to present a complete, concise, and thoroughly up-to-date textbook of clinical cardiology. In this aim he succeeds admirably. By enlarging the first edition about 25 percent, numerous recent topics of clinical interest are included which are not elsewhere available in comparable textbook form.

Established concepts are simply presented with emphasis on clinical practicability as opposed to historical development. Similarly, recent trends are presented in condensed form which, albeit opinionated, are generally conservative while being fair. Included are sections on ballistocardiography, diagnostic technics applicable in the evaluation of lesions amenable to heart surgery, newer drugs, et cetera.

Other features of merit are: A bibliography mainly applying to work done in the last 5 to 10 years; unusually complete and accurate index and table of contents; mainly diagrammatic (as opposed to photographic) illustrations; clear and direct style; and excellent format. The biggest drawback is the number of one-sided opinions authoritatively presented.

This volume will be most appreciated by physicians in diverse fields, who are interested in a thoroughly modern text of cardiology of unusually wide coverage, yet relatively brief in form.

—R. B. DICKERSON, Lt. Col., MC, USA

PRACTICAL NEUROLOGY, by *Leo M. Davidoff*, M. D. and *Emanuel H. Feiring*, M. D. 442 pages. Landsberger Medical Books, Inc. Distributed solely by the Blakiston Division of the McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price $7.

This is the latest in a series of handbooks for the general practitioner. It includes a wide survey of neurologic methods, diagnosis, therapy, and results, presented in a clear, concise manner. The amazing completeness as to essentials, in so small a text, is a tribute to the authors. Should some wonder at the ability of one of America's leading neurosurgical teams to produce a basic general neurologic text of this nature, one has only to note their diagnostic criteria and therapeutic principles to realize their penetrating grasp of the material, which varies from tumors of the nervous system through inflammatory and degenerating processes.

It is recommended, not only to the general physician, but to all interested in a ready reference on fundamental elements of neurologic disease.—*JAMES F. HAMMILL, Lt. Col., MC, USA*

BLOOD SUPPLY AND ANATOMY OF THE UPPER ABDOMINAL ORGANS, With a Descriptive Atlas, by *Nicholas A. Michels*, M. A., D. Sc. (Louvain). 581 pages; 172 illustrations, including 166 in color. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $24.

This anatomy book is written for study and use by surgeons, but is so complete and detailed in its descriptions and illustrations that I am sure it will be consulted by anatomists as well. The anatomy of the upper abdominal organs is a subject in which every surgeon should be well versed, and this volume presents it so well and completely that it should be required reading and study for every surgeon, and particularly for every young resident surgeon.

The anatomic descriptions of the organs and their blood supply are complete in nearly all details. The charts and illustrations show clearly the detailed anatomy of the areas, and present, as shown in no other available text, the innumerable variations in anatomy which the surgeon may encounter in upper abdominal operations.

The surgical literature today is replete with reports of catastrophes precipitated by surgeons operating in the upper abdomen. If the detailed anatomy in this book were common knowledge to all surgeons, many of those accidents and their unfortunate results could surely be avoided.

—*FELIX P. BALLENGER, Comdr. (MC) USN*

THE HEMORRHAGIC DISORDERS, A Clinical and Therapeutic Approach, by *Mario Stefanini*, M. D. and *William Dameshek*, M. D. 368 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1955. Price $11.75.

This is an authoritative, amply illustrated, clearly written volume on the clinical and laboratory diagnosis and treatment of the hemorrhagic disorders. In contrast to most other current texts on this subject, it gives proper emphasis to other hemostatic defects in addition to those of the coagulation mechanism, namely, defects in the vascular, platelet, and fibrinolytic mechanisms.

The authors have made this book thoroughly up to date by giving due consideration to the "newer" entities of "dysproteinemic," vascular, and fibrinolytic purpuras as well as hemorrhagic disturbances of pregnancy and the puerperium. They have even furnished an addendum of significant findings reported in the literature in early 1955.

Of especial practical value to the practicing physician are the many time-saving and space-saving diagnostic tables, including "screening tests" and therapeutic tables, as well as detailed directions on therapy. Stimulating to the investigator in this and related fields will be the several theories suggested for the cause or pathogenesis of various hemorrhagic disorders.

The authors have admirably achieved their objective of writing a practical, well-balanced book on this important subject. At the same time, they have accomplished this in a scholarly manner.

—*H. LEONARD JONES, Comdr. (MC) USN*

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ATLAS OF ROENTGEN ANATOMY OF THE SKULL, by *Lewis E. Etter*, M. D., F. A. C. R. With a Section on The Radiographic Anatomy of the Temporal Bone, by *J. Brown Farrior*, M. D., F. A. C. S., and a Section on the Roentgen Anatomy of the Skull in the Newborn Infant, by *Samuel G. Henderson*, M. D., F. A. C. R. and *Louise S. Sherman* M. D. 216 pages; 239 plates. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $14.75.

This "Atlas of Roentgen Anatomy of the Skull" should prove to be one of the outstanding contributions of the year to radiology and anatomy alike. To students, it will be an invaluable aid and a treasured addition to their libraries. The complexities of the anatomy of the skull have always been a source of confusion to both student and teacher. To the radiologist, experienced observer though he be, interpreting the numerous overlapping shadows seen in radiographs of the skull and face is not only confusing but irritating. This is true also for those who consult him and particularly for his residents in training.

Dr. Etter's logical method of approaching the subject and the results he has obtained simplify this problem remarkably. The excellence of his plates and the clearness of the marking of anatomic points give confidence both to the interpreter and to the seeker of information. His technic of dissecting the various bones of the skull, photographing and radiographing them in the standard positions used by radiologists, and then carrying out the same procedure on the dry skull with the particular bone removed and then replaced gives convincing information not otherwise obtainable.

Of particular interest is the delineation of the component parts of the sphenoid bone and their shadows seen through the orbits and the bones of the face. The zygoma and the temporomandibular joints are superbly illustrated. The section by Dr. J. Brown Farrior on the temporal bone, so valuable in the study of the mastoids, is outstanding.

The work of Dr. Samuel G. Henderson and Dr. Louise S. Sherman on the skull of the newborn will always remain a classic.

The author is to be commended on this masterpiece which will be a boon not only to radiologists and students but to all surgeons who operate in this anatomic region.—*JOHN A. ISHERWOOD, Col., MC, USA*

APPLIED MEDICAL BIBLIOGRAPHY FOR STUDENTS, by *William Dosite Postell*. 142 pages. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $4.50.

Although books designed to instruct the student in the general methods of bibliographic research abound, few are as well designed to meet the special needs of the medical student as is this volume. Its three general sections include a necessarily brief yet comprehensive history of medical scholarship, from the earliest manuscripts to current journals; a detailed and specific outline of the organization of the medical library; and a simple, lucid exposition of the methods of scientific research and the mechanics of writing the scholarly paper.

Parallel with the chronological discussion of historical bibliography are illuminating comments on the factors influencing the development and directions of scientific thought in various cultures. The section on modern bibliography presents the organization of the medical library: indexes and card catalogs, basic references, and the organization of the periodical collection. "Methods of Bibliography" concerns the principles of scientific investigation; researching, organizing, and writing the reference paper; and the methods and purposes of documentation. Appendixes include a bibliography of medical dictionaries, directories, encyclopedias, and yearbooks; recommended readings for each section; and study questions for review.

Especially designed for the medical student, this book will be particularly welcomed by those whose instruction in bibliography in undergraduate days was inadequate or haphazard. Its clarity and brevity should earn for it an enthusiastic reception from both the harried student engaged in research and the busy librarian whose aid he enlists.—*M. E. LE MAY*

TALKING WITH PATIENTS, by *Brian Bird,* M. D. 154 pages. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $3.

This little book might be considered a handbook as well as a text, because it represents a guide to the physician and physician-to-be in a large number of areas of the doctor-patient relationship. While the book is written by a psychiatrist, it is intended primarily for the physician in all fields of medicine. The language is such that the author's concepts are presented clearly and concisely without rejecting accepted principles of psychiatry on the one hand, or "talking down" to the nonpsychiatrist on the other. The approach might be broadly considered as "common sense" and practical. Each chapter is brief and easily read. Numerous anecdotes are related and, while the author avoids the "cookbook" approach to common problems, numerous tactful suggestions are given.

Some chapter titles include "The Angry Patient," "The Guilty Patient," "The Anxious Doctor," "Separation from Parents," and "Talking with Parents." The last-named chapter provides some excellent ideas in an area which offers difficulty to many physicians. Here the author positions himself well between the "doctor is always right" and the "parent is always right" views. A typical observation is "When the doctor does become angry it is often worthwhile for him to review the situation to learn whether the mother really is doing harm to her child and the medical treatment, or whether she is merely hurting the doctor's feelings. If it is merely his feelings, perhaps he can afford to let her have her way."

This book represents a well-written contribution to the literature on the art of medicine. It is strongly recommended for reading by medical students, interns, and residents in all fields. Most experienced physicians also will find that time devoted to reading it will have been profitably spent. —*WILLIAM HAUSMAN, Maj., MC., USA*

OFFICE PROCEDURES, by *Paul Williamson*, M. D. 412 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1955. Price $12.50.

This new book presents in a clear and practical manner the most frequently used procedures in general practice. Many helpful suggestions in regard to improvisation of equipment are given and illustrated. The numerous illustrations, which are simple drawings, are so precisely placed that the text leads directly into them. They are a remarkable demonstration of "a picture is worth a thousand words," for which the author and publisher deserve great credit.

The entire field of medicine is well covered in 15 sections as follows: ear, nose, and throat; eye; musculoskeletal system; gynecology; obstetrics; urology; proctology; pediatrics; minor surgery; internal medicine; psychological testing; anesthesia; physiotherapy; the small laboratory; and roentgenography. The subject matter contained in these sections is well indexed. The printing, binding, and format of the book are excellent, and it makes an extremely useful reference book for any practicing physician. Aside from the practical value of this volume the author's sense of humor makes the text delightful reading.

—*PATRICK I. McSHANE, Col., MC, USA*

PRINCIPLES OF MEDICAL STATISTICS, by *A. Bradford Hill*, C. B. E., D. Sc., Ph. D., F. R. S. 6th edition, revised and enlarged. 314 pages. Oxford University Press, New York, N. Y., 1955. Price $4.

The publication of the sixth edition of this book is evidence of a continuing demand for a good presentation of the logic of the statistical method as applied to the field of medicine. Without doubt, Professor Hill has been successful in accomplishing his objective, which in his own words is "to set down as simply as possible the statistical methods that experience has shown me to be most helpful in the problems with which medical workers are concerned."

To detail the innumerable virtues of this book at the time of its sixth edition would be excessive, but three of these warrant special mention. In the first place, the book reads well, and the discussions relate to topics with which the physician is familiar and has had experience. Secondly, the author clearly demonstrates that logic is the cornerstone of the statistical method. In fact, throughout the book, the reader is aware that the statistical method, properly applied, can be a valuable adjunct in making decisions. Finally, the use of the nonmathematical approach makes elementary arithmetic the only prerequisite for an intelligent understanding of the use and computation of such measures as the arithmetic mean, the standard deviation, and chi-square.

In this edition there is a new chapter on clinical trials in which most of the problems encountered in testing the efficacy of a new drug or new treatment are discussed. The importance of randomness in the selection of test and control subjects is pointed out. In fact, in order to assist the physician in organizing the clinical trial the author has

added an appendix on random sampling numbers, consisting of 10,000 such numbers with instructions for their use. However, the brief section on the ethics of using the human being as test or control animal could well have been omitted since it is irrelevant to the subject matter of the book.

There is no doubt that the smallness of the volume has its advantages. However, the size limits the extent of discussion of some of the topics. For instance, the author does not adequately discuss the "Presentation of Statistics." Such graphic presentations as bar charts, pie charts, or the treatment of discrete variables in general are not touched upon. Notwithstanding the author's preference, these are widely used in the presentation of medical statistics. It is hoped that graphic presentation will be discussed more fully in the next edition.

—*LOUIS P. HELLMAN*

SURGERY OF THE AMBULATORY PATIENT, by *L. Kraeer Ferguson*, M. D., F. A. C. S., with a Section on Fractures by *Louis Kaplan*, M. D., F. A. C. S. Contributors: *Harry M. Burros*, M. D., F. A. C. S., *Edwin J. Pulaski*, M. D., D. M. SC. (Surg.), F. A. C. S., and *Hrant H. Stone*, M. D. 3d edition. 866 pages; 664 illustrations. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $12.

In his third edition of "Surgery of the Ambulatory Patient," Dr. Ferguson has compiled an authoritative, up-to-date, complete, and logical guide to the care of the surgical outpatient. This book is intended for the use of the general practitioner, the industrial surgeon, the physician caring for military or hospital dispensaries, and the intern, and for the instruction of the student in outpatient surgery.

The first of three parts discusses the general considerations of the office equipment and preparation needed for surgery, the pre- and postoperative treatment of the ambulatory patient, as well as numerous surgical technics. Also, Dr. Stone and Dr. Pulaski very adequately cover anesthesia and the treatment of surgical infections, respectively.

The second part deals with regional surgery. The sections dealing with salivary tumors and tumors of the neck will probably provoke considerable controversy. Therefore, it is felt that these sections, in part, may be inappropriate in a text intended for the student of surgery. The sections on the anus, the genito-urinary system, and the hand are exceptionally well done.

The third section is concerned with the general considerations and principles of treatment of traumatic injuries of the musculoskeletal system. This concise and orderly presentation is enhanced by the presence of many excellent diagrams and photographs.

The book is well indexed and contains a good bibliography at the end of each chapter. It is enthusiastically recommended as a ready reference for the busy practitioner or dispensary doctor.

—*OAKLEY K. PARK, Maj., USAF (MC)*

PRINCIPLES OF PUBLIC HEALTH ADMINISTRATION, by *John J. Hanlon*, M. S., M. D., M. P. H. 693 pages; 47 illustrations. 2d edition. The C. V. Mosby Co., St. Louis, Mo., 1955. Price $8.50.

The author has had a wealth of new experiences in the international health field since the publication of the first edition of this book. With this experience and the newer advances in the field of public health, he has added new material to this edition. This material consists of new advances in public health dentistry, atmospheric and stream pollution, housing, chronic noncommunicable diseases, mental health, health education by use of television, and rehabilitation.

This book is of great value to those in the field of public health administration. The author, obviously, has an excellent comprehension of the various problems which may confront health personnel.

Of special value in either establishing or implementing an adequate health program are the chapters covering economic justification of public health activities, sociologic aspects of public health, cultural anthropology and public health, and public relations in the public health program.

I believe that this is one of the most essential books to use in pursuing the profession of public health.

—*INGALLS H. SIMMONS, Lt. Col., MC, USA*

MENTAL HYGIENE IN PUBLIC HEALTH, by *Paul V. Lemkau*, M. D. 2d edition. McGraw-Hill Series in Health Science, *Amos Christie*, M. D., Consulting Editor. 486 pages. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price $8.

This book is presented in two parts, the first of which concerns the place of mental hygiene in public health and the second the development of man from conception to death. The first part presents the most important contribution made by this book, for although the scope of public health in relation to the control of communicable diseases and in the field of hygiene and sanitation is well established, its relationship to diseases other than those of infectious origin is newer and not so well recognized. This is particularly true in the field of psychiatry, and more so because the care of those with certain mental diseases such as the psychoses and feeble mindedness has been a responsibility of the state and the community for many years and has resulted in official programs being established under the direction of medical authorities not trained in public health principles and practice. Advanced psychiatric knowledge and thinking have resulted in a concept of mental hygiene that includes the prevention of mental disease and disability. Thus there is presented the problem of two medical groups: the public health group whose concern has long been prevention rather than treatment of disease and who have little technical knowledge of mental disease, and the psychiatrists who have the professional knowledge of mental disease but have not had experience in the application of this

knowledge to the whole population. The merging of these two medical groups for the best and most effective applications of their separate capabilities is no small problem. In part 1 Doctor Lemkau discusses all aspects of the problem and points out that there is no single solution applicable to all communities. His is a very realistic appraisal, and the suggestions that he offers toward the establishment of mental hygiene programs or for the attainment of certain mental hygiene objectives without formal programs are practical and should prove most useful to all concerned either with psychiatry or with public health. Part 2 discusses the development of man from conception to death, and describes briefly the mental and emotional disturbances which may take place as the result of environmental pressures. The application and usefulness of mental hygiene concepts to remedy and prevent these disturbances are also discussed.

This book should be read and owned by all public health physicians. Part 1 should be useful to psychiatrists as well, but the book would be especially valuable to the public health officer who may have forgotten his psychology and psychiatry but who nevertheless recognizes that his responsibility for the health of the community extends beyond the control of communicable diseases and the development of a physically normal child.—*JOSEPH H. McNINCH, Col., MC, USA*

THE DENTAL ASSISTANT, edited by *John C. Brauer*, D. D. S., M. SC. 398 pages; illustrated. The Blakiston Div., McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price $7.

This compact textbook has been prepared to guide dental assistants toward greater dental knowledge and efficiency. The editor and 13 authors, all dental teachers and practicing dentists, have produced a masterly work. The book meets all educational requirements of the extension course of the American Dental Assistants Association and the American Dental Association.

Chapters are devoted to instruction in the fundamentals of efficient office administration, systematic patient routines, and supply functions. Basic technical background information covering dental anatomy, bacteriology, pathology, pharmacology, and other sciences are included in other chapters. Dental materials and their use are discussed in detail. Instruction throughout the book is always centered on the theme of increasing the general practical efficiency of the assistant.

Included also are a glossary that provides definitions and pronunciations of 761 dental terms, and a complete topic index. The text is illustrated profusely by 131 excellent drawings and photographs.

This book deserves a place in every dental library. Dentists should find it a useful aid for rapid and effective training of their assistants, and the dental assistant will find the book easy to read and a valuable daily guide to efficiency and dental knowledge.

—*KENNETH R. ELWELL, Lt. Col., USAF (DC)*

THE MANAGEMENT OF ORAL DISEASE, A Treatise on the Recognition, Identification, and Treatment of Diseases of the Oral Regions, by *Joseph L. Bernier,* D. D. S., M. S., F. D. S., R. C. S. (Eng.). 825 pages; with 1,001 text illustrations and 5 color plates. The C. V. Mosby Co., St. Louis, Mo., 1955. Price $15.

This book, as reflected by its title, covers an area of interest to the oral surgeon, otolaryngologist, and general dental surgeon, as well as the internist and dermatologist. It is spotty in its coverage, however, and there are some important omissions. Much can be learned from a perusal of the book as certain diseases are very well described, in a language easily understandable and not ambiguous. The colored and some of the black and white reproductions are excellent. Others, however, suffered in the printing.

The omissions and deficiencies are as follows:

The section in Chapter 1 on bacteriology makes no mention of cultural methods or sensitivity tests. There is need for a section on surgical anatomy, physiology, and pharmacology. Anesthesiology is only referred to briefly and could well be given a separate chapter and include the subjects of cardiac arrest, asphyxia, and anoxia. The section on pathology details the cellular pathology as taught 25 years ago, but does not mention the newer concepts of humoral pathology. The mechanism of trismus is not described, antra-oral fistula and sinusitis are not mentioned, and Sjorgens syndrome is not mentioned by name or symptom. The temporomandibular joint syndrome of Costen is omitted, no mention is made of management of fractures, and cleft palate work is omitted entirely. In his description of the lip shave operation (page 437) he omits the highly important detail of removing the mucous glands of the lip.

In spite of these deficiencies the book does contribute to the understanding and management of oral disease. It is too bad that the author did not seek advice from the allied specialties mentioned above, whose practitioners are vitally interested in this area.

—*LEROY L. KENNEY, Capt. (MC) USN*

NURSING PRACTICE AND THE LAW, by *Milton J. Lesnik* and *Bernice E. Anderson,* R. N., Ed. D. 2d edition. 400 pages. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $6.

The second edition of this authoritative text comprises a completely new approach to the relationship between the law and nursing practice. Although major emphasis is placed on the legal control of professional nursing care of patients, legal responsibilities of practical nurses are adequately discussed by means of an attempt to analyze practical nursing functions.

In the preface, the authors point out that "in the legal problem field itself, an increasing number of cases involving nurses have been before the courts" and that within the nursing profession as a whole it is be-

lieved that "recognition and assumption of professional responsibility by registered nurses can be enhanced by the recognition and the assumption of the legal responsibilities of nursing."

The general areas covered include: the meaning of law and its relationship to nursing; legal procedure and trial; legal control of nursing and nursing practice acts; contracts for nursing services; legal status of nurses; legal aspects of liability for torts; and legal aspects of negligence, malpractice, crime, and wills.

The basic principles of legislation relating to the practice of nursing are illustrated effectively through numerous and varied accounts of actual cases.

The source footnotes are adequate and data essential to the basic intent of the textual material are effectively presented in the appendix in the form of pertinent definitions of the practice of nursing and analyses of selected nursing practice acts.

This book has inestimable value as an authoritative compilation of source material and as a text for use in the instruction of both professional and nonprofessional nursing service personnel as to their respective legal responsibilities in the practice of nursing.

—DOROTHY V. ELLIOTT, Maj., ANC, USA

PHARMACOLOGY IN NURSING, by *Elsie E. Krug*, R. N., M. A. and *Hugh Alister McGuigan*, Ph. D., M. D. 703 pages; illustrated, with 41 text illustrations and 8 color plates. 7th edition. The C. V. Mosby Co., St. Louis, Mo., 1955. Price $4.75.

The authors have presented the fundamentals of pharmacology in nursing in a most interesting manner. Service to the nurse, not only in the practice of nursing but also as an aid in teaching, is the real value of the book. The material is presented without the use of superfluous text and is well organized; well-chosen illustrations of correct procedures are provided. The chapter on drugs that affect the central nervous system is outstanding in all respects. The authors have drawn freely from many sources including the current literature, and have given full credit in their bibliography of references. The questions following each chapter are excellent and should aid the student to grasp the material presented. This book should be valuable for informal study and as a ready reference for specific items of information. *—ORVILLE SUMMERS, HMC, USN*

THE YEAR BOOK OF MEDICINE (1955-1956 Year Book Series), edited by *Paul B. Beeson*, M. D., *Carl Muschenheim*, M. D., *William B. Castle*, M. D., *Tinsley R. Harrison*, M. D., *Franz J. Ingelfinger*, M. D., and *Philip K. Bondy*, M. D. 711 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price $6.

As have its predecessors in years past, this little volume offers to the internist and general practitioner a comprehensive review of significant contributions in the field of internal medicine for 1954-1955. A distinguished group of editors have assembled short abstracts under

the following general categories: infections, the chest, the blood and blood-forming organs, the heart and blood vessels, the kidney, the digestive system, and metabolism.

Controversial points of view and experimental data of great potential importance receive comment by the editors.

As the number of medical journals increases it becomes more and more difficult to be thoroughly informed on all new contributions. This book joins its predecessors in presenting to the reader the broad spectrum of new thought in internal medicine. The expected by-product is to stimulate the reader to seek out the original articles on subjects of personal interest.

The basic format is the same as previous editions. The quality of paper, cover, and binding are excellent.

—DAVID B. CARMICHAEL, Lt. Comdr. (MC) USN

MODERN TRENDS IN PSYCHOSOMATIC MEDICINE. Edited by *Desmond O'Neill.* 375 pages. Paul B. Hoeber, Inc., Medical Book Dept. of Harper & Bros., New York, N. Y., 1955. Price $10.50.

Although this book will probably be of primary value to the general practitioner who will thoroughly enjoy the forceful presentations of the intricate relationship of mind and body in medicine, it also will serve as supplementary reading for interns and residents in psychiatry. Because the book is a compilation of 21 chapters by many different British authors, a single article can be read in its entirety at one time without the loss of continuity of thought which might be experienced in a more closely organized volume.

In a work of this scope, which of necessity contains controversial material, it is natural that one encounters statements which widen the vista of provocative thought. Thus by stimulating the thinking along psychosomatic avenues, the physician will not only gain new perspectives in his practice but will likewise recognize the need for much additional research in this fertile field.

In brief, this volume with its wealth of reported research and theoretic speculations will find a wide audience among those whose daily pursuits permit only limited ancillary reading. Perhaps the most delightful prose that this reviewer has read for a long time was encountered in the chapter by H. St. H. Vertue titled "Music and Migraine," which although lacking some of the meat of earlier chapters serves as a delightful interlude in a work of this type. The student of medicine, as well as the professor, will find the detailed bibliography and the associated listings of pertinent literature an excellent frame of reference for additional study in the psychosomatic aspects of medical treatment. Certainly, with the recent introduction of numerous drug therapies for emotional disorders that have had such a widespread acceptance, it behooves the consultant to reflect seriously for a mo-

ment on the possibilities of a psychic origin of a disorder before he uses an oft-times deceptive panacea. Both the editor and his professional associates have done a commendable piece of work and are deserving of attention.—*JAMES M. BAILEY, Lt. Col., MC, USA*

ESSENTIALS OF MEDICINE, The Art and Science of Medical Nursing, by *Charles Phillips Emerson, Jr.*, M. D., and *Jane Sherburn Bragdon*, R. N., B. S. 17th edition. 922 pages; 268 illustrations, including 19 subjects in full color. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $4.75.

This revised edition is comprehensive in the coverage of medical conditions, including a chapter on nursing care of the geriatric patient and nursing in disaster. The authors have stressed the increasing responsibilities of the nurse's participation in the newer diagnostic and therapeutic tests. The nurse's role in the education of patients is also stressed.

As an introduction to each section a discussion of the anatomy and physiology of the systems is given, and at the end there is a detailed outline of nursing care, a complete list of recent references, and a problem situation which may serve as a review for the professional student nurse. A description of newer drug therapy in the treatment of medical conditions is adequately discussed.

Charts of the contour and linear type are used to show the sociologic trends in relation to public health. To illustrate dermatologic conditions 12 colored photographs are shown. Photographs and drawings which illustrate nursing care are used throughout the book. The index is sufficient to serve as a convenient guide for the location of reference material.

This well-known work may be used as a textbook for the professional student nurse, and as a reference for the graduate professional nurse.

—*ADELINE T. BELL, Capt., USAF (AFNC)*

BRITISH MEDICAL BULLETIN, Hormones in Reproduction, Volume XI, Number 2. 170 pages; illustrated. Published by Medical Department, The British Council, London, May 1955. Distributed by Oxford University Press, New York, N. Y. Price $2.75.

This volume is devoted to the subject of hormones in reproduction. Authorities in the field of endocrinology, biochemistries of hormones, and fertility in animals and humans have contributed excellent articles in the discussion of this very perplexing but most important problem. Each article contains valuable data from recent reports, and appended to all is a very complete and useful bibliography. The completeness of this symposium is particularly evident by the fact that such basic subjects as external stimuli and neurohumeral mechanisms in reproduction are very interestingly discussed in the first two contributions. The biology and biochemistry of the gonadotropins are discussed in detail with graphic presentations. The biology of hormones is presented, as well as a discussion of the synthetic preparations.

The clinical value of the controversial subject of hormone estimations is well presented. In addition to the discussion of the gonadal and pituitary roles in reproduction, there are articles on hormones and mammary growth and function, adrenal cortex in reproduction, and hormones in the problem of human fertility. This bulletin is particularly interesting, therefore, to endocrinologists and clinicians who have a profound interest in the problem of human fertility. To the clinician it is interesting to find that the conclusions of these authorities show that clearly defined endocrine causes of infertility are relatively uncommon; also, that assays of the reproductive hormones should be considered only in conjunction with clinical findings and in relation to the limitations to the methods employed.— *HUMBERT L. RIVA, Lt. Col., MC, USA*

A TEXTBOOK OF PHYSIOLOGY, edited by *John F. Fulton,* M. D., Sterling Professor of the History of Medicine, Yale University School of Medicine, with the collaboration of twelve contributors. 17th edition. 1,275 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1955. Price $13.50.

This book was written primarily for the student of medicine. It presents in a clear, precise way an excellent review of the established theories as well as a stimulating discussion of current controversies.

The authors of sections have evidently maintained close liaison with each other in presenting facts and theories, with minimal confusion from one section to the other.

The emphasis on physiology of the nervous system is immediately apparent, about one third of the book being alloted to this subject.

A single reviewer could not hope to analyze critically each of the specialist author's material. In general comparison with other standard medical texts, the following criticisms are offered:

The discussions of nervous system physiology are superlative, covering the basic features more than adequately. The multitude of polygraphic presentations throughout the text greatly clarify the presented ideas. The endocrine section is clearly presented although adversely abbreviated. The same may be said for the section on body fluids and kidney function—I had the feeling the author wishes to expand the portion on fluid balance and its disturbances.

Criticism of a specific section as an example of the entire text can be directed at the section on endocrine system. A clear, precise presentation of this difficult field is presented. Examples of pathologic conditions, however, could be more fully exploited to clarify presented theories. Refreshingly noted in the thyroid section was the author's attempt to assimilate very new work into known theories.

The index is adequate and the references are of two types, reviews and late research articles, fundamentally necessary for the student.

—*RICHARD E. OGBORN, Maj., MC, USA*

GYNECOLOGY SURGICAL TECHNIQUES, compiled and edited by *Robert J. Lowrie*, M. D., F. A. C. S. Foreword by *J. P. Greenhill*, M. D. 1st edition. 523 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $17.75.

This book is the work of 58 contributors from the United States, England, and Canada. The volume is well arranged and presents both major and minor procedures in gynecologic surgery, including pre- and post-operative care. The data are readily available because of a large, comprehensive index and prominent captions. Practically every gynecologic operation is described in detail by contributors of world renown, who have had personal experience with the procedure. In many instances a basic operative procedure is described by different contributors, each of whom exhibits a special technic, thus enabling the beginner to select a simple procedure or the experienced surgeon to add another method in order to broaden his scope.

Among the many features are radical operations for advanced cancer of the female reproductive tract by prominent exponents and pioneers in this field, and technics for repair and diversion of the urinary channels. There is also a comprehensive chapter on cesarean section in which such important items as incidence, indications, choice of procedure, and new interpretations on legal aspects are thoroughly discussed.

This well-prepared text should appeal not only to the obstetrician-gynecologist but to the general surgeon, general practitioner, and particularly to the aspirant to specialty certification.

—*MARCUS A. GODINEZ, Comdr. (MC) USN*

OPERATIVE TECHNIC IN GENERAL SURGERY, edited by *Warren H. Cole*, M. D., F. A. C. S. 67 contributing authors. Introduction by *Frank H. Lahey*. 2d edition. 1,004 pages; 1,247 illustrations. Appleton-Century-Crofts, Inc., New York, N. Y., 1955. Price $20.

The title of this book is somewhat misleading as it is much more than "operative technic." Anyone who is acquainted with the work of the editor would suspect that history, anatomy, physiology, chemistry, and philosophy of surgery would be included, as indeed they are, not only in a general discussion but in many instances as applied to individual surgical conditions.

The first edition of this outstanding book, published in 1949, is already part of the armamentarium of most general surgeons. The editor and his 67 contributors are leaders of the surgical teaching profession and are not only well aware of the advances in surgical knowledge but in many cases have made major contributions to the subjects of which they have written for this book. The second edition is, therefore, very timely.

In his introduction, Dr. Frank H. Lahey states that it is impossible for a surgeon to obtain great technical skill in any given operative

procedure except by having a special interest in the procedure and performing it over and over again. This book is notable in that the authors of the various sections meet this qualification and are acknowledged authorities and contributors to the literature in the subjects they have described so well. Some of the contributors are John D. Stewart, Robert Elman, Waltman Walters, Clarence Dennis, Alexander Brunschwig, Warren Cole, Thomas G. Orr, Harvey S. Allen, and Sumner Koch.

In addition to changes of text and additional illustrations, three new chapters have been included: one on "Blood Transfusions and Allied Problems" by Dr. J. Garrott Allen, the second on "Gastrointestinal Surgery in Infancy and Childhood" by Dr. William Riker, and the third on "The Appendix" by Dr. John Reynolds. To make room for these new chapters, three chapters formerly appearing in the first edition of this volume have been transferred to Volume Two.

It is the opinion of the reviewer that this is the best and most authoritative volume available on operative technic. It is doubtful that the experienced surgeon who has kept abreast of the current surgical literature will find it necessary to purchase the second edition as a replacement for the first. It is believed, however, that all general surgeons who do not have the first edition should have this book, and that all medical libraries should have the new edition as a reference book for general surgeons, interns, and residents.

—*MARSHALL N. JENSEN, Col., USAF (MC)*

THE LACRIMAL SYSTEM, Clinical Application, by *Everett R. Veirs*, M. D. 159 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1955. Price $7.50.

Although there have been many contributions on the various phases of lacrimal disease up to the present time, no one volume has adequately covered the whole subject. Dr. Veirs has fulfilled this need in this excellent volume.

His description is lucid, easy to read, and in comfortably large print. The text is well indexed, and accompanying it are many fine illustrations. Beginning with a review of the anatomy and physiology of the lacrimal system, each phase of lacrimal disease is thoroughly discussed. The chapter on genetic and developmental anatomy is especially notable for the excellent serial histologic sections showing original work on the final stages in the fetal development of the naso-lacrimal duct. This form of presentation gives the reader a clear understanding of neonatal disease of the naso-lacrimal system.

Therapy is divided into conservative and operative types, with the newer phase of conservative therapy, involving the use of polyethylene tubing, explained and illustrated. Dr. Veirs' methods are presented with case histories to further elucidate the description. Operative therapy and technics of both the external and intranasal types are presented.

Each will be of interest to the ophthalmologist and otolaryngologist. The results of each procedure in the hands of competent operators are set forth and readily permit evaluation.

The abbreviated manner in which the bacteriologic and tumor sections of this volume have been presented may be cause for mild criticism by those who may have a deeper interest in these subjects.

Though the material presented is not essentially new, it is complete and documented by the bibliography. For concise coverage of lacrimal system disorders, this text is well recommended for the ophthalmologist, otolaryngologist, and pediatrician. —*WILLIAM L. BERKLEY, Capt. (MC)USN*

DIAGNOSIS OF CONGENITAL HEART DISEASE, A Clinical and Technical Study by the Cardiologic Team of the Pediatric Clinic, Karolinska Sjukhuset, Stockholm: *Sven R. Kjellberg, Edgar Mannheimer, Ulf Rudhe,* and *Bengt Jonsson.* 649 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price $22.

This is an outstanding book published by the cardiologic team of the pediatric clinic at the famed Karolinska Sjukhuset, Stockholm. The text is representative of the team approach to the diagnosis of congenital heart disease and is based on the studies of 396 cases of congenital heart disease investigated at the above institution between October 1951 and June 1954. These patients were studied most extensively by means of conventional radiography, electrocardiography, calibrated phonocardiography, electrokymography, cardiac catheterization, and angiocardiography for the purpose of appraising the value of the respective methods in the diagnosis of congenital heart disease. Two of the authors are radiologists and two are pediatric cardiologists. This profusely illustrated book contains a mass of information and cannot be read without adding to the knowledge of any radiologist, cardiologist, internist, or pediatrician who is interested in the diagnosis of congenital heart disease.

The most outstanding contribution of this book is to exploit and illustrate the potential of high-speed biplane regional angiocardiography to enable the clinician to actually "visualize" pathologic lesions in the living heart. This is tremendously enhanced by the careful correlation of angiocardiographic and autopsy findings which has added to existing knowledge of the pathology and pathologic physiology of congenital heart disease. In contrast to the other portions of the text the electrocardiographic considerations are somewhat perfunctory and add little to existing knowledge.

This text represents another step forward in helping the cardiologist and radiologist meet the continuing demand for ever-increasing precision in the diagnosis of heart disease as the possibilities of surgical correction are extended.—*WELDON J. WALKER, Lt. Col., MC, USA*

New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Those of greatest interest will be selected for review in a later issue.

CLINICAL ORTHOPAEDICS, No. 6. *Anthony F. DePalma,* Editor-in-Chief. 219 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $7.50.

PUBLIC RELATIONS FOR THE PHARMACIST, by *William H. Hull,* M. A. 132 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $4.50.

THE YEAR BOOK OF PEDIATRICS (1955-1956 Year Book Series), edited by *Sydney S. Gellis,* M. D. *Isaac A. Abt,* M. D., Editor Emeritus. 431 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price $6.

THE HOUSE PHYSICIAN'S HANDBOOK, by *C. Allan Birch,* M. D., F. R. C. P. 160 pages. The Williams & Wilkins Co., Baltimore, Md., 1955. Price $3.

QUICK REFERENCE BOOK FOR NURSES, by *Helen Young,* R. N., and *Eleanor Lee,* R. N. 7th edition. 727 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $4.

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. Surgery in World War II. Hand Surgery, edited by *Sterling Bunnell,* M. D. 447 pages; illustrated. Prepared in the Historical Unit, Army Medical Service, Editor-in-Chief, Colonel *John Boyd Coates,* Jr., MC, under the direction of Colonel *Calvin H. Goddard,* MC, AUS; Associate Editor for Hand Surgery, *Mary E. McDonald;* Assistant Editor, *Janie W. Williams.* Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $3.50.

THERAPY OF FUNGUS DISEASES, An International Symposium, edited by *Thomas H. Sternberg,* M. D. and *Victor D. Newcomer,* M. D. Presented June 23, 24, 25, 1955, by the Division of Dermatology, Department of Medicine, School of Medicine and Medical Extension, University Extension, University of California at Los Angeles. 337 pages; illustrated. Little, Brown and Co., Boston, Mass., 1955. Price $7.50.

FUNCTIONAL OTOLOGY, The Practice of Audiology, by *Morris F. Heller,* M. D., with *Bernard M. Anderman,* M. A., and *Ellis E. Singer,* M. A. 225 pages; illustrated. Springer Publishing Co., Inc., New York, N. Y., 1955. Price $5.50.

GLAUCOMA, A Symposium organized by the Council for International Organizations of Medical Sciences, established under the joint auspices of UNESCO and WHO. Editor, Sir *Stewart Duke-Elder,* England. 350 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $7.50.

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